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**Going Against the Flow:
Attitudes Related to Interest in Unconventional Menstrual Products**

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Bridgewater State University

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Abstract

The current research examined psychological factors that contribute to interest in unconventional menstrual products, including the commonly studied menstrual cup, but also menstrual underwear, reusable pads, and the menstrual sea sponge. Because unconventional menstrual products are reusable and require cleaning, they are less convenient than conventional menstrual products, requiring more contact with one's body and menstrual fluids during menstruation. Therefore, people who feel that menstruation is bothersome and disgusting/shameful or people who self-objectify are unlikely to be interested in these products. In contrast, people with more pro-environmental attitudes might find reusable products more appealing. Pro-environmentalism involves significant consideration for others; therefore, those who value communion could also be drawn to these products. Thus, this survey assessed whether interest in unconventional menstrual products was related to negative menstrual attitudes, increased self-objectification, communal values, and concern for the environment. Through the online platform *Prolific Academic*, this study recruited 269 English-speaking participants between ages 18 and 45 who experienced menstruation within the last year. Correlations revealed partial support for the hypotheses that positive menstrual attitudes and pro-environmental attitudes would be related to more interest in unconventional menstrual products. Additionally, qualitative data from open-ended responses provided supplemental information regarding rationale for (dis)interest in these products. Though experimental research is needed, these findings contribute to the limited existing literature and suggest that promoting positive menstrual attitudes and environmental awareness might be beneficial in diverting environmental harm created by the consumption of conventional menstrual products.

Going Against the Flow:

Attitudes Related to Interest in Unconventional Menstrual Products

From menarche to menopause, menstruation is an experience that is unavoidable for many people all over the world. However, individuals maintain the ability to assert and uphold a degree of choice in how they manage their menstrual experience. Despite there being a range of menstrual products available, the products that most people have become accustomed to using and recommending have predominantly been disposable pads and tampons (International Planned Parenthood Federation, 2020; Ridder, 2021; Statista, 2020). Because of the strong social norms regarding the use of these conventional products, there might be less consideration put into where they are coming from or the impact of their consumption. It seems that most conventional products become popular because they are the norm, they are easy and convenient, and they do not require much thought or education when it comes to their purchase or utilization. Additionally, certain methods of managing menstruation might become normalized through generational advice or patterns. Mothers are a primary source of information about menstruation and associated products (Chrisler & Zittel, 1998; Costos et al., 2002; Lee, 2008). Interestingly, recent qualitative research conducted by Field-Springer et al. (2018) has revealed generational shifts resulting in an increased willingness to discuss reproductive health, specifically menstruation. Thus, the current moment could be ripe for a newfound openness to unconventional menstrual products.

In decades past, menstrual activism focused heavily on the education and health of menstruating consumers (Bobel, 2008). There was considerable concern around topics like toxic shock syndrome specifically, and the ways in which products were being produced, advertised, and consumed, until the 1990s when there was an increase in drive toward alternative products.

Today, while the products most often chosen by consumers are disposable pads or tampons, some lesser-known unconventional products may be chosen due to their marketed and perceived environmental friendliness on account of their reusability (e.g., menstrual cup, menstrual underwear). Many people consider the environment when making consumer choices (Sachdeva, 2015). However, consumer choices related to menstruation are not equivalent to other consumer choices. Specifically, individualized choices related to the management of one's body during menstruation are more private and intimate than some other pro-social choices that impact the environment (e.g., switching to a reusable water bottle or choosing paper over plastic bags for groceries) which may be discussed and exhibited more openly (Johnson et al., 2018). Thus, attitudes and values unrelated to environmentalism might also be quite relevant to interest in unconventional menstrual products.

Comfort is a feeling that is highly related to menstruation on both an individual and societal level. A menstruating individual might choose to use products based on the perceived physical comfort in the actual use of the product or based on the comfort they have with menstruation as a concept, both pertaining to comfort felt with one's own body especially during active menstruation. For example, consistently in both Kenyan and American studies focused on the use of menstrual cups, there was reported concern toward the size and use (e.g., insertion) of this type of product (Grose & Grabe, 2014; Mason et al., 2013; van Eijk et al., 2018).

Avoiding discomfort is also an important theme when it comes to the perception of menstruation as taboo in society. Marketing is often focused on maintaining femininity and modesty but also hints at the importance of cleanliness including odor control and overall freshness (Berg & Coutts, 1994; Merskin, 1999; Simes & Berg, 2001; Spadaro et al., 2018). For example, it is common knowledge that many menstrual product commercials utilize blue liquids

instead of red to convey the absorption of menstrual blood in a way that is intended to be more viewer friendly. It is worth noting that the unconventional products discussed in this study are rarely advertised and can even require explicit research from an individual interested in the purchase and use of these products compared to conventional ones. Thus, people who might seek out unconventional products could be actively looking for a change in their menstruating experience, specifically something that might better suit them not only physically, but potentially in better coordination with their identity and values as a (menstruating) consumer.

For the current study, unconventional products have been defined to include the menstrual cup, menstrual underwear, reusable pads, and menstrual sea sponges (see Appendix for full written descriptions). These unconventional products are more eco-friendly compared to conventional products in that they are reusable rather than disposable. These four specific products also provide a range when it comes to the collection versus absorption processes of containing menstrual blood and fluids. While the menstrual cup collects fluids and thus must be emptied before being washed, dried, and reused, the remaining three products absorb menstrual fluids before being washed, dried, and reused. This difference in containment is important because it could contribute to observed differences in attitudes toward these products and reasons for or against using them, especially in terms of comfort and convenience.

Much of the available research regarding unconventional menstrual products has focused solely on the menstrual cup and often its use in the less industrialized world where challenges with menstrual hygiene can impact young girls' confidence, comfort, and most specifically school absenteeism (Mason et al., 2013; van Eijk et al., 2018). However, little research has been conducted in the United States, especially with a focus on this broad a range of unconventional menstrual products and attitudes toward these products in various contexts. The current research

was conducted with the goal of understanding why people may or may not be interested in unconventional menstrual products, with a specific emphasis on four variables: menstrual attitudes, self-objectification, agentic versus communal values, and environmental attitudes.

Menstrual Attitudes and Self-Objectification

Disposable products offer a sense of convenience, allowing the user to almost become unaware of or detached from them. Therefore, conventional disposable menstrual products might be chosen over others because they provide the consumer with a sense of distance from the experience of menstruation and its management (Ashley et al., 2005; Davidson, 2012).

Alternatively, unconventional products are much more involved and require much more consciousness regarding one's body, the products themselves and their use, and the feelings associated with both the products and the experience of menstruation as a whole. Thus, relative attitudes toward menstruation can be interpreted to include both the way one feels in their individual menstrual experience as well as the feelings toward the concept of menstruation as a result of society, and the expression and internalization of the social stigma toward the experience (Chrisler, 2003; Jackson, 2019; Johnston-Robledo & Chrisler, 2011; Johnston-Robledo & Stubbs, 2012; Wister et al., 2013).

Common feelings toward menstruation include disgust, shame, loathing, and self-consciousness (Roberts, 2004). These attitudes and emotions are commonly reinforced by media and marketing, and in turn internalized by their audience, creating a vicious cycle that reinforces the presence of these attitudes in addition to how they are transmitted (Johnston-Robledo & Chrisler, 2011). Within marketing specifically, there are efforts made to maintain minimal, sometimes even hidden, discussion of the menstruation experience (Merskin, 1999; Spadaro et al., 2018) while where discussion prevails, emphasis is put on concepts including femininity,

modesty, sanitization, deodorization, freshness, etc. (Berg & Coutts, 1994; Simes & Berg, 2001). There is also a portrayed sense of value in the control or purity associated with bodies, specifically those of women during menstruation (Berg & Coutts, 1994; Simes & Berg, 2001).

Relatedly, prior research about menstrual attitudes related to the menstrual cup has noted self-objectification (Grose & Grabe, 2014) and menstrual shame as important variables (Grose & Grabe, 2014; Lamont et al., 2019; Milne & Barnack-Tavlaris, 2019). Self-objectification, as proposed by Fredrickson and Roberts (1997), outlines that over time individuals, women especially, internalize an observer's perspective of the self and in turn accept that they are beings that exist to be observed and evaluated by an outside source. Self-objectification has been noted to result in increased body monitoring among other potentially harmful effects (Fredrickson & Roberts, 1997; Fredrickson et al., 1998; Grabe et al., 2007; Mercurio & Landry, 2008). Shame is recognized as a byproduct of self-objectification (Fredrickson & Roberts, 1997) and can most simply be defined as the feeling that occurs when ideals, whether internalized, cultural, or both, are not met (Scheff, 2003). As discussed by Darwin (1872/1965), shame can occur not only in self-reflection, but also in the expectation of being perceived by others.

Research has repeatedly shown links between self-objectification and body shame (Grabe et al., 2007; Lamont et al., 2019; Mercurio & Landry, 2008; Moradi & Huang, 2008) as well as between self-objectification and negative attitudes toward menstruation, specifically menstrual shame (Grose & Grabe, 2014; Roberts, 2004; Schooler et al., 2005). Grose and Grabe (2014) found that higher levels of self-objectification were correlated with negative attitudes toward menstruation including feelings of bother, disgust, and shame, which then correlated with lower probability of purchase or use of the menstrual cup. Additionally, Milne & Barnack-Tavlaris (2019) showed explicitly that higher scores of menstrual shame correlated with more negative

attitudes toward the menstrual cup and less future intentions including purchase, use, and recommendation of this product. Between both studies, it was discussed that products outside the norm may be rejected due to how self-objectification and menstrual shame manifest in the discomfort with one's own body during menstruation (Roberts, 2004; Schooler et al., 2005), and especially with menstrual blood, which would not be easily distanced from and disposed of with an unconventional product as typical with a conventional product. Thus, the current study aimed to replicate and expand upon relationships previously found regarding menstrual attitudes and self-objectification in the realm of unconventional menstrual products.

Agency and Communion

Both menstrual attitudes and self-objectification are typically associated with women (e.g., Fredrickson et al., 1998; Fredrickson & Roberts, 1997; Roberts, 2004; Schooler et al., 2005; Tiggemann & Lynch, 2001), as are communion and communal values (e.g., Diekman et al., 2017; Laurent & Hodges, 2009; Moskowitz et al., 1994; Twenge, 1997). Beginning in early childhood, girls are socialized to think and act more communally (Diekman et al., 2017), with more emphasis put on the relationship to others, specifically in the way of compassion and nurturing, both attributes of the gender roles commonly attributed to girls and women (Eagly & Wood, 2012). Bakan (1966) first introduced the concepts of "agency" and "communion" in an essay heavily focused on religious topics, defining agency in terms of individual existence, while communion is the existence of an individual as a part of a larger whole. Agency considers separation and individualization while communion entails relationships and what is outside the self (Bakan, 1966). Though these terms carry their own definitions and context, the present study considers individuals on a continuum that avoids the binary either/or definitions of these terms (Trapnell & Paulhus, 2012). In other words, one may display higher tendencies toward agency or

communion but are not solely defined as one or the other. Modern psychologists have examined these concepts in the context of traits (e.g., Spence et al., 1979), goals and motivations (e.g., Diekmann et al., 2017), and values (e.g., Trapnell & Paulhus, 2012). The latter will prove the most relevant to the current study, though they are all interrelated; individuals with communal attitudes and values likely would want these attitudes and values to manifest in and be conveyed by their actions, or at least their intentions (Godin & Kok, 1996), on account of Ajzen's (1991) theory of planned behavior.

Communal values such as altruism, compassion, and civility (Trapnell & Paulhus, 2012) may be especially relevant in relation to environmental attitudes in the same way that morality underlies many communal values. One study (Horne & Huddart Kennedy, 2019) showed a link between communion and pro-environmental attitudes and behaviors. Though it was in the context of political ideology, their study concluded that pro-environmental attitudes and behaviors are at least partially based in feelings of responsibility for and connectedness to others, both prominent features of communion. Because of the link made between communal tendencies and environmental attitudes, the prediction was made that those who endorse communal values will show more interest in unconventional menstrual products perceived as environmentally friendly.

Environmental Attitudes

Discussion of environmental issues and solutions increasingly came into public consciousness, including policymaking, in the 1970s (Van Liere & Dunlap, 1980). Since then, environmental issues have expanded in both quantity and variation. As the world changes and environmental consciousness increases, eco-friendly (also known as green or sustainable) consumption has seemingly become more popular in both discussion and action. There has been

increasing amounts of research (Gifford & Nilsson, 2014) in which attitudes and behaviors regarding the well-being and protection of the environment are examined with the goal of identifying patterns and understanding what is at the root of this type of thinking.

There are some obstacles when it comes to green consumer behavior. Tseng (2016) examined the concept of green consumerism in Taiwan and how differences in price and advertising affected intentions and behaviors of consumers. Findings suggest that sometimes, what keeps people from being ethical or green consumers are external factors in the consuming world such as price, availability, or advertising. However, this research and others (e.g., Johnson et al., 2018; Luchs & Mooradian, 2011) also hints toward the importance of internal dilemmas such as values and motivations when it comes to pro-environmental behaviors. The current research anticipated that environmental attitudes would be reflected in the motivation toward or interest in unconventional menstrual products.

Those who tend to exhibit more pro-environmental attitudes and behaviors include younger generations, self-proclaimed liberals and democrats, and those with higher socioeconomic status including more education (Dunlap & Van Liere, 1978/2008; Tognacci et al., 1972). Relevant to the current study, some authors have also found that gender is an important variable when analyzing environmental attitudes and green consumerism (e.g., Bloodhart & Swim, 2020; Luchs & Mooradian, 2011; Zelezny et al., 2000). Research suggests that women, due to potential effects of socialization (Zelezny et al., 2000) and connections to personal values (Stern et al., 1993), are more concerned with social justice, nature, and social and environmental responsibility (Zelezny & Bailey, 2006), including the consideration of the consequences of their behaviors, especially in consuming (Mainieri et al., 1997). For example, in one study, female adolescent consumers had higher levels of environmental concern, perceived

seriousness of environmental problems, perceived environmental responsibility, peer influence, and green purchase behavior compared to male adolescent consumers (Lee, 2009). These findings support those of Zelezny et al. (2000) who found that longitudinally, girls consistently expressed higher environmental concern, feelings of environmental responsibility, and interest in pro-environmental behaviors, compared to boys. Interestingly, research has also suggested that women are more likely to engage in private pro-environmental behaviors compared to men who are more likely to engage in public pro-environmental behaviors (Bloodhart & Swim, 2020; Dunlap, 1970; Hunter et al., 2004), an idea that contributes further to the prediction that menstruating women may be interested in environmentally friendly menstrual products as part of their more intimate consumption behaviors.

There are many attitudes one can hold that are relevant to environmentalism (Milfont & Duckitt, 2010). For instance, there are measurable environmental attitudes such as those related to personal conservation behavior, environmental threat or fragility, and altering nature. The current study aims to analyze the relationship between these three specific subsets of environmental attitudes and attitudes toward unconventional menstrual products. First, positive attitudes toward the purchase and use of unconventional menstrual products should indicate that one is supportive of personal conservation behavior, a facet that encompasses the care taken in everyday activities with the consciousness that such activities occur in effort to conserve or protect the environment. Additionally, both environmental fragility and altering nature are concerned with whether humans have the right to interfere with the environment and the consequences of such interference. Environmental fragility or threat specifically refers to the idea that the environment is vulnerable to human behavior and that consequences of this behavior are inevitable and serious. Altering nature refers to the question of whether humans

should have the right to alter or use nature to their benefit. Eco-friendly consumption may be a behavioral response to concerns around environmental fragility/threat and altering nature.

Because unconventional menstrual products are examples of eco-friendly consumer goods, pro-environmental attitudes, especially those concerning personal conservation behavior and feelings of the environment as vulnerable to human activity, could be related to increased interest in these products.

The Current Study

Existing research in the realm of unconventional menstrual products has focused mainly on the study of the menstrual cup in different contexts including school absenteeism in other countries (Mason et al., 2013; van Eijk et al., 2018), as well as menstrual attitudes and self-objectification (Grose & Grabe, 2014; Lamont et al., 2019; Milne & Barnack-Tavlaris, 2019), with adolescents and university students being the most commonly represented age groups. The current research aimed to expand upon existing research, including a wider range of unconventional menstrual products as well as psychological variables not previously explored together in relation to these products.

More negative menstrual attitudes indicate increased bother, disgust, and shame when it comes to menstruation. Increased self-objectification indicates less comfort with the body, including more shame. Therefore, participants who feel more negatively toward menstruation or those who self-objectify might feel more negatively toward unconventional menstrual products, especially those that require more comfort and contact with the body during menstruation.

Therefore, this study tested the following hypotheses:

H1: Those who display more negative menstrual attitudes would display less interest in unconventional menstrual products.

H2: Those who display increased self-objectification would display less interest in unconventional menstrual products.

Unconventional menstrual products are reusable and thus may appeal to those with more concern for the environment. Therefore, this study tested the following hypothesis:

H3: Those who display more pro-environmental attitudes would display more interest in unconventional menstrual products.

Pro-environmentalism involves significant consideration for others, thus those who value communion could also be drawn to these products. Therefore, this study tested the following hypothesis:

H4: Those who display more communal values would display more interest in unconventional menstrual products.

Additionally, this study included exploratory analyses to broaden the understanding of interest in unconventional menstrual products. These analyses included those of demographic variables such as age, race/ethnicity, prior knowledge and use of such products, as well as

similarities and differences in participants' open-ended responses indicating rationale for or against the purchase and use of these products.

Method

Participants

Participants were recruited through the online platform *Prolific Academic*, which modestly compensates participants and allows researchers to screen participants in order to ensure certain demographics are represented in a sample. This study specifically sought out English-speaking participants between the ages of 18 and 45 (i.e., premenopausal adults) who experienced menstruation within the last year. A power analysis was performed using G*Power software to indicate how many participants would be sufficient for conducting bivariate correlations. Results showed that 138 participants would be needed to detect a small correlation ($r = .30$) with 95% power at an alpha level of .05. Therefore, 280 participants, the maximum allowed per the study's funding with regard to compensation, would be more than enough to test the proposed hypotheses.

The final sample contained 269 participants¹ ranging in age from 18 to 45 years ($M = 29.1$, $SD = 7.3$) after a portion of participants ($n = 11$) were excluded due to lack of experiencing a period within the last year ($n = 7$) and for significant missing data ($n = 4$). Participants were given the option to self-identify with one or multiple race/ethnicity categories. Aside from one participant who chose not to disclose this demographic, the majority of participants identified as

¹ Data regarding gender was neither analyzed nor reported in the final sample because attempts to be inclusive seemed to prove confusing for participants. Participants were given the option to identify as cisgender male, transgender male, cisgender female, transgender female, non-binary, or other, for which they could provide their own text response. Some participants may have been confused about the terminology used despite the short descriptions included with each option. Most importantly, all 269 participants included in the final sample reported having experienced menstruation within the last year and thus were assumed to have viable responses throughout the survey.

White (72.1%), among other choices including Asian (17.1%), Hispanic or Latinx (8.6%), Black/African American (8.2%), American Indian or Alaskan Native (0.7%), Native Hawaiian or Pacific Islander (0.7%), or other, in which the participants entered free text describing their racial/ethnic identity (1.1%).

The majority of the sample reported either bachelor's degree (38.3%) or high school graduate (34.6%) as their highest degree or level of school completed. In regard to current employment status, there was a diversity of responses including the majority being employed full-time (41.3%), and similar frequencies among students (19.3%), those employed part-time (18.2%), and those unemployed (17.1%). There was also a seemingly even distribution of average annual household income, with the most popular responses being \$50k-75k (22.3%), \$25k-50k (21.2%), and less than \$25k (19.3%).

Procedure and Materials

Materials were approved by the university's Institutional Review Board. Participants provided informed consent through survey response. Survey questions were first asked about unconventional menstrual products and personal menstrual history. The current study's other variables of interest (menstrual attitudes, self-objectification, agentic and communal values, and environmental attitudes) were then measured in a randomized order to avoid unintentional priming effects. Participants then reported personal demographic data before being debriefed about their participation in the study as the survey concluded. It should be noted that the survey was first distributed to seven pilot participants to ensure survey completion times were around 15 minutes. These participants were friends or acquaintances of the researchers and their data was not included in the final sample.

Attitudes and Knowledge of Unconventional Menstrual Products

To assess participants' attitudes and knowledge about various alternative menstrual products, the researchers modified questions created by Grose and Grabe (2014) in their study evaluating attitudes and knowledge about the menstrual cup. Instead of analyzing a physical product as in the original study, participants in the current study were shown an image and given a short, factual description (see Appendix for complete descriptions) for the menstrual cup, menstrual underwear, reusable menstrual pads, and menstrual sponge. Immediately following the picture and description of one product, participants were asked whether they had previously heard of it and then provided responses to other questions including: "Would you use the [product name] if provided to you?" (from 1 [*definitely would*] to 5 [*definitely would not*]); "Based on the description, would you buy the [product name] if priced within your budget?" (from 1 [*very unlikely*] to 5 [*very likely*]); "Would you recommend the [product name] to a friend or acquaintance?" (from 1 [*definitely will*] to 5 [*definitely will not*]); and "How favorable is your overall reaction to [product name]?" (from 1 [*terrible*] to 5 [*excellent*]). After appropriate reverse scoring, overall interest for each unconventional product was measured by averaging responses indicating intent to use, purchase, and recommend, and overall reaction; higher mean scores indicated more interest in each product. Satisfactory Cronbach's Alpha values were calculated for each product: menstrual cup ($\alpha = .91$), menstrual underwear ($\alpha = .92$), reusable pads ($\alpha = .93$), and menstrual sponge ($\alpha = .89$).

Participants were also provided an open-ended question asking them to briefly explain why they would or would not use each indicated product. Provided responses were analyzed using inductive coding; relevant codes were determined based on what was common among responses after many evaluations, and then applied to find frequencies of significant themes within the data.

Attitudes Toward Menstruation

Attitudes toward menstruation were measured using the Menstrual Self-Evaluation Scale (Roberts, 2004). For the purpose of the current study, two subscales were utilized to assess Menstruation as Bothering (e.g., “Menstruation is something I have to put up with;” five items; $\alpha = .70$) and Menstruation as Disgusting or Shameful (e.g., “I am embarrassed when I have to purchase menstrual products;” six items; $\alpha = .76$). Participants were asked to indicate their response to the provided 11 items on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Scores are generated by averaging responses; higher scores indicate more negative attitudes toward menstruation.

Self-Objectification

Self-objectification was measured using the Self-Objectification Questionnaire (Noll & Fredrickson, 1998). In order to assess the degree to which participants have internalized objectifying ideas about their bodies, participants ranked 10 items according to how they impact physical self-concept from 1 (*least impact*) to 10 (*greatest impact*), with each ranking allowed to be used once. Items include five appearance-based items (e.g., weight, physical appearance, firm/sculpted muscles) and five competence-based items (e.g., physical coordination, health, energy level). Scores are generated by separately summing ranks of appearance-based items and competence-based items and then subtracting the sum of the competence ranks from the appearance ranks. Acquired scores can range between -25 and 25 with higher scores indicating higher levels of self-objectification.

Agentic and Communal Values

Agentic and communal values were measured through Trapnell and Paulhus' (2012) Agentic and Communal Values scale (ACV). These authors created this scale based on the

premise that agentic and communal values were implicit in other scales that measure values or life goals, and that there was no scale to measure agentic and communal values specifically. The shortened version of this scale requires participants to assign a value of 1 (*not important to me*) to 10 (*highly important to me*) to 12 values, six that represent agency (e.g., achievement, power, recognition; $\alpha = .78$), and six that represent communion (e.g., altruism, compassion, civility; $\alpha = .67$). Participants are informed that they can use numbers more than once, but should try to include a range of responses after considering all provided values. Scores are generated by averaging scores for agentic and communal values separately; higher scores indicate higher values in each realm.

Environmental Attitudes

To assess participants' environmental attitudes, Milfont and Duckitt's (2010) Environmental Attitudes Inventory (EAI) was utilized. Though the full EAI contains 120 items, the current study only utilized three subscales from the shortened EAI-72, for a total of 18 items requiring participant response. The three subscales utilized included Personal Conservation Behavior (e.g., "Whenever possible, I try to save natural resources."; $\alpha = .83$), Environmental Threat/Fragility (e.g., "Humans are severely abusing the environment."; $\alpha = .83$), and Altering Nature (e.g., "Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us."; $\alpha = .78$). Responses were indicated on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Scores are generated by averaging the numbers associated with responses. Higher scores indicate more pro-environmental thinking is present in that individual.

Demographics

Toward the beginning of the survey, participants were asked to provide personal menstrual history including which menstrual products they typically use, as well as regularity,

duration, and flow of their menstrual cycle. To conclude the survey, participants were asked to provide basic demographic information before being debriefed. Questions were asked in order to assess gender identity, age, race/ethnicity, education, employment, and income. Where applicable, participants were given the option to choose “other” and fill in their own response. Lastly, open text boxes were provided to allow for participants to give feedback regarding the study, including the opportunity to indicate something they felt they had learned through participating in the study. These open-ended questions were part of a technique used to differentiate bot responses from real human responses, thus avoiding an issue common in online survey distribution and data collection.

Results

The means and standard deviations of each variable can be seen in Table 1. Bivariate correlations were run to test a portion of the hypotheses, as shown in Table 2.

A Priori Analyses

Do Individuals with More Negative Menstrual Attitudes Show Less Interest in Unconventional Menstrual Products?

The Menstruation as Bothersome subscale had a small but significant negative correlation with interest in the reusable pad, $r(267) = -.18, p = .003$, and the menstrual sponge, $r(267) = -.12, p = .047$. As feelings of menstruation as bothersome increased, there was less interest in the reusable pad and menstrual sponge. There were no significant correlations found between the Menstruation as Bothersome subscale and interest in the menstrual cup or menstrual underwear.

The Menstruation as Disgusting or Shameful subscale had a small but significant negative correlation with interest in the menstrual cup, $r(267) = -.26, p < .001$, and the reusable pad, $r(267) = -.17, p = .007$. As feelings of menstruation as disgusting or shameful increased,

there was less interest in the menstrual cup and reusable pad. There were no significant correlations found between the Menstruation as Disgusting or Shameful subscale and interest in the menstrual underwear or the menstrual sponge.

In summary, there were significant findings in the case of both menstrual attitude subscales regarding interest in the reusable pad, but not consistently with the remaining three unconventional menstrual products. Thus, these correlations revealed partial support for the hypothesis that negative menstrual attitudes would be related to less interest in unconventional menstrual products.

Do Individuals with Increased Levels of Self-Objectification Show Less Interest in Unconventional Menstrual Products?

There were no significant correlations found between self-objectification and interest in unconventional menstrual products. Therefore, the hypothesis that individuals who reported increased levels of self-objectification would show less interest in unconventional menstrual products was not supported.

Is There a Link Between Menstrual Attitudes and Self-Objectification?

There were no significant correlations found between either of the menstrual attitude subscales and the measurement of self-objectification. Thus, the hypothesis that there would be a relationship between these two variables was not supported.

Do Individuals with More Pro-Environmental Attitudes Show More Interest in Unconventional Menstrual Products?

The Personal Conservation subscale had a small but significant correlation with interest in the menstrual cup, $r(267) = .16, p = .008$, and reusable pad, $r(267) = .15, p = .011$. As there were increased feelings of environmental responsibility through personal conservation behaviors,

interest in the menstrual cup and reusable pad increased. There were no significant correlations found between this subscale and the other two unconventional products, menstrual underwear and the menstrual sponge.

The Environmental Fragility/Threat subscale also had a small but significant correlation with interest in the menstrual cup, $r(267) = .12, p = .049$, and reusable pad, $r(267) = .15, p = .011$. As there was an increase in the perception that the environment is fragile or threatened, interest in the menstrual cup and reusable pad increased. There were no significant correlations found between this subscale and the other two unconventional products, menstrual underwear and the menstrual sponge.

The Altering Nature subscale also had a small but significant correlation with interest in the menstrual cup, $r(267) = .18, p = .003$, and reusable pad, $r(267) = .29, p < .001$. As there was more resistance to the idea of altering nature for human benefit, interest in the menstrual cup and reusable pad increased. There were no significant correlations found between this subscale and the other two unconventional products, menstrual underwear and the menstrual sponge.

In summary, all three subscales measuring environmental attitudes showed significant correlations with interest in the menstrual cup and reusable pad, but not with interest in menstrual underwear or the menstrual sponge. These correlations revealed partial support for the hypothesis that those with more pro-environmental attitudes would show more interest in unconventional menstrual products.

Do Individuals with More Communal Values Show More Interest in Unconventional Menstrual Products?

There were no significant correlations found between communion and interest in unconventional menstrual products. Therefore, the hypothesis that individuals who value communion would show more interest in unconventional menstrual products was not supported.

Is There a Link Between Pro-Environmentalism and Communal Values?

There was a small but significant correlation between the Personal Conservation subscale and communion, $r(267) = .27, p < .001$. This indicates that individuals who value personal conservation also report higher endorsement of communal values. There were small but significant correlations found between the measure of agency and the other two subscales, Environmental Threat, $r(267) = -.17, p = .005$, and Altering Nature, $r(267) = -.19, p = .001$. This indicates that people who report increased agentic values do not think the environment is threatened or fragile, and think that altering nature for the benefit of humans is acceptable. Based on these findings, the hypothesis predicting a link between communion and pro-environmentalism was partially supported.

Exploratory Analyses

Does Age Relate to Interest in Unconventional Menstrual Products?

There was no significant correlation found between age and interest in unconventional menstrual products.

Are There Differences in Racial/Ethnic Groups in Relation to Interest in Unconventional Menstrual Products?

There were no statistically significant differences in interest in unconventional menstrual products between racial/ethnic groups, as determined by a one-way ANOVA (analysis of variance).

Does Prior Knowledge of Unconventional Menstrual Products Relate to Interest in Said Products?

People who reported having previous knowledge of the reusable pad ($n = 152, 56.5\%$, $M = 3.3, SD = 1.1$) showed more interest in this product than people with no previous knowledge ($n = 117, 43.5\%$, $M = 2.5, SD = 1.1$), $t(267) = 5.87, p < .001$. Prior knowledge of the products did not significantly relate to interest in the case of the menstrual cup ($n = 259, 96.3\%$), underwear ($n = 232, 86.2\%$), or sponge ($n = 47, 17.5\%$).

Does Prior Use of Unconventional Menstrual Products Relate to Interest in Said Products?

Participants who reported previously using at least one of the four unconventional products examined in this study ($n = 68, 25.3\%$) also consistently showed more interest in these products.

People who had previously used one of these products showed more interest in the menstrual cup ($M = 4.3, SD = 0.8$), than those who had not ($M = 3.04, SD = 1.03$), $t(139.4) = 10.25, p < .001$. People who had previously used one of these products showed more interest in menstrual underwear ($M = 3.8, SD = 1.1$), than those who had not ($M = 3.2, SD = 1.1$), $t(267) = 3.88, p < .001$. People who had previously used one of these products showed more interest in reusable pads ($M = 3.4, SD = 1.1$), than those who had not ($M = 2.8, SD = 1.1$), $t(267) = 3.81, p < .001$. People who had previously used one of these products showed more interest in the menstrual sponge ($M = 2.3, SD = 0.9$), than those who had not ($M = 1.9, SD = 0.9$), $t(267) = 2.75, p = .006$.

Thematic Analyses

What Are Some Common Themes Within Rationale For or Against Use of the Menstrual Cup?

In qualitative responses regarding interest or disinterest in the menstrual cup, the most frequent themes represented the mention of the *environment* or that the product was *reusable* (coded together; 30.9%), the product's *efficacy* (23.4%), and the *application* of the product (21.9%). Other common themes present in the responses included *maintenance* (17.5%) and *comfort* (16.7%). While some participants were fond of the product's reusability and potentially positive environmental impact, others felt deterred by the idea of a reusable menstrual product in general. Many participants expressed concern for whether the product would be effective with multiple mentions of a concern for leaks or messiness when using this product. Some participants also discussed concerns regarding the maintenance of this product, specifically the washing process. Other notable themes within responses included the concern for the application, specifically the insertion and removal of the cup, as well as the comfort in said application and general use. One code unique to this product emerged due to the volume of responses indicating that this product would require a *learning* process (14.5%), and this process' potential ease or difficulty. See Table 3a for additional information.

What Are Some Common Themes Within Rationale For or Against Use of Menstrual Underwear?

In qualitative responses regarding interest or disinterest in menstrual underwear, the most frequent themes represented the mention of *comfort* (37.2%), *efficacy* (37.2%), and *convenience* (20.8%). Other common themes present in the responses included *maintenance* (15.6%), *flow* (14.9%), as well as two codes unique to this product, one regarding its potential as a *backup* product rather than use on its own (10.8%), and another that the product would be useful at *night* or when *sleeping* (coded together; 4.8%). In regard to comfort and convenience, participants both noted the potential comfort and ease of a product that is not inserted, as well as the contrasting

idea that the product may feel wet and therefore would not be comfortable to wear throughout the day. Similarly, participants expressed concern for whether the product would sufficiently contain menstrual fluids, often mentioning a worry of leaks or messiness when using this product, especially depending on various menstrual flows. For example, some participants expressed the idea that a product like this may not be able to effectively handle their self-described heavy flow. See Table 3b for additional information.

What Are Some Common Themes Within Rationale For or Against Use of Reusable Pads?

In qualitative responses regarding interest or disinterest in reusable menstrual pads, the most frequent themes represented the mention of *maintenance* (36.4%), the product's *environmental* or *reusable* qualities (35.7%), and *convenience* (24.9%). Other common themes present in the responses included *application* (21.6%), *efficacy* (20.1%), and *comfort* (17.5%). Participants expressed maintenance-related concern regarding the need to wash this product in order to reuse it, specifically the discomfort that comes with washing this product with their regular laundry. Additionally, there were some participants fond of the product's reusability and potentially positive environmental impact, and others deterred by the idea of a reusable menstrual product in general. Some participants were drawn to the application of this product, as they expressed their existing comfort using disposable pads and openness to try a reusable one. However there was also concern for the effectiveness of this product in containing menstrual fluids, including concern for mess and leaks, as well as discussion of the comfort of wearing moistened fabric and the potential for the pad to shift or bunch up, possibly making it both uncomfortable and ineffective. See Table 3c for additional information.

What Are Some Common Themes Within Rationale For or Against Use of the Menstrual Sponge?

In qualitative responses regarding interest or disinterest in the menstrual sponge, the most frequent themes represented the mention of *application* (40.9%), *hygiene* or *safety* (27.9%), and the product's *environmental* or *reusable* qualities (coded together; 22.7%). Other common themes present in the responses included *efficacy* (19%), and *comfort* (16.7%). Overall, participants were very unfamiliar with this product and expressed concern with the idea of the need to insert the sponge, more specifically the lack of applicator and of a string for removal. Many participants discussed the possibility of this product being unhygienic, specifically that it might harbor bacteria or cause infection easily, and also the potential dangers of this product becoming stuck after insertion. In contrast to the environment-related discussion in the responses to the other products examined in this study, many reactions to this product included a specific concern that sponges would be harvested from the ocean, therefore potentially disrupting nature rather than contributing positively to it. However, similarly to other products' responses, there was again concern expressed regarding whether this product would work to contain menstrual fluids including worry about mess or leaks, as well as concern regarding the potential physical discomfort involved in the use of this product, specifically in regards to the insertion method and the material of the product. See Table 3d for additional information.

Discussion

This study aimed to analyze relationships between interest in unconventional menstrual products and psychological variables including menstrual attitudes, self-objectification, agentic and communal values, and environmental attitudes. Data collected showed partial support for hypotheses related to menstrual attitudes and environmental attitudes. Correlations revealed that more negative menstrual attitudes were related to less interest in unconventional menstrual products, while more pro-environmental attitudes were related to more interest in these products.

There was support for the hypothesis that there would be a correlation between communion and environmental attitudes, but no significant correlation was found between communion and interest in unconventional products. There was also no support for hypotheses related to self-objectification, neither in its relationship to interest in unconventional menstrual products nor to menstrual attitudes.

These results provide support for the theory that negative menstrual attitudes, more specifically increased feelings of shame, would relate to less interest in unconventional menstrual products whose use require more contact with the menstruating body. Therefore, the current research provides support to previous research (Grose & Grabe, 2014; Lamont et al., 2019; Milne & Barnack-Tavlaris, 2019) that revealed a relationship between negative menstrual attitudes and negative attitudes toward or lower probability of use of reusable menstrual products like the menstrual cup. However, like Lamont et al. (2019) and Milne and Barnack-Tavlaris (2019) found, the current study's results did not show support for the theorized connection between menstrual attitudes and self-objectification as mediated by shame, and how these ideas may relate to interest in unconventional menstrual products.

While it could have been by chance that these results were not corroborated, this inconsistency may also be due to a change in the overall role of self-objectification. Previous findings involving the relevant variables of self-objectification, menstrual attitudes, and unconventional menstrual products were from younger samples of university students (Grose & Grabe, 2014; Lamont et al., 2019; Milne & Barnack-Tavlaris, 2019). Research regarding age and self-objectification has pointed to the idea that younger women might be more vulnerable to its effects (Greenleaf, 2005; McKinley, 2006; Rollero et al., 2018; Tiggemann & Lynch, 2001). Thus, the case may be that the current study's sample from the general population with a wider

age range from 18 to 45 resulted in different reports of self-objectification compared to earlier studies. With an increase in recognition of devastating environmental change, it may also be that concern for the environment is overpowering potential effects of self-objectification in consumer choices.

The current study's findings were consistent with broader findings that indicate pro-environmental attitudes relate to reusable products in general (Barr, 2007; Milfont, 2009); however, the current findings contradicted those of Lamont et al. (2019) who did not find a relationship between pro-environmentalism and interest in unconventional menstrual products, specifically the menstrual cup and reusable pad. In fact, these very products that did not produce significant results in research by Lamont et al. (2019) were associated with significant relationships between increased pro-environmental attitudes and increased interest in the current study. Thus, it appears that negative attitudes relating to menstruation and menstrual products did not overshadow environmental attitudes in the current study as they may have in previous research. The current findings do, however, align with those of Horne and Huddart Kennedy (2019) who found a relationship between communion and pro-environmentalism. Interestingly though, there was not a direct significant correlation between communion and interest in unconventional products. This could be because the overlap between communion and environmental attitudes is not the same as the overlap between environmental attitudes and unconventional menstrual products. In other words, people may be drawn to pro-environmentalism because of its communal aspect, but this may not reflect in consumer attitudes and behaviors because products themselves may not be perceived as contributing to communal values directly.

Interestingly, the current research revealed that knowledge of unconventional menstrual products appears to be increasing over time with Grose and Grabe's (2014) 33% and Milne and Barnack-Tavlaris' (2019) 75.8% of participants reporting prior knowledge of the menstrual cup, compared to the current study's 96.3%. However, the current study analyzed a broader range of unconventional menstrual products than provided by previous research on the menstrual cup alone. More specifically, the current study introduced unconventional menstrual products with varying modes of both application and containment of menstrual blood and fluids. Differences between the products themselves as well as differences in their associated interest and relation to other variables suggest that studying a variety of unconventional menstrual products is important. For example, the reusable pad was the only product consistently included in all of the significant correlations for this study. Further research involving a variety of products could help in continuing to make sense of the relevance in the differences between the products and how they are used, as well as the reasons why people may be attracted to or deterred from their consumption, as were introduced in the qualitative findings of this study.

Overall, qualitative responses revealed important details about the rationale behind interest and disinterest both among and between the products presented. Coding revealed unique codes for two of the products, the *learning curve* regarding the menstrual cup and the potential for the menstrual underwear to be better used as a *backup* or at *night*. However, while the majority of codes were consistent across the products, their frequencies were found to vary within responses for the various products studied. For example, grouped as one code in this study, *hygiene, sanitation, and safety* were relevant among all four products' responses, yet this code's higher frequencies presented in regard to the inserted products, the menstrual cup (10.8%) and sponge (27.9%).

Cost or *investment*, coded together, were also frequent themes throughout all of the products except for the menstrual sponge. This may be because the menstrual cup, menstrual underwear, and reusable pads are products that seem attainable either in stores or online, whereas the menstrual sponge is more foreign as a concept, and may not seem as easily accessible, therefore not inciting many thoughts relating to its purchase.

Comfort and *application*, separate codes but often coded simultaneously for a single response, were also interesting codes among the four products, for varying reasons. In the case of the inserted products (menstrual cup and sponge), common responses included the mention of product size or material, compared to the external products (underwear and reusable pads) whose common responses included discussion of the feeling of “moisture sitting there all day” or the product “feel[ing] like a wet diaper”.

As a whole, most responses coded as *convenience* discussed potential difficulty with the use of these products in public, specifically in a work setting. These types of responses align with the idea that disposable conventional products are often used because they offer the user convenience and perhaps an easier menstrual experience with room to forget or ignore the processes related to menstruation. Interestingly, *convenience* was in the top three most frequent codes for responses pertaining to reusable pads, one of the two products whose related interest correlated significantly with the menstruation as bothersome subscale. Oppositely, the second product that yielded these menstrual attitude results, the menstrual sponge, did not have *convenience* within its top codes, but rather this was the third to least frequent code among its associated responses. These findings indicate that while participants’ interest in reusable pads and the menstrual sponge both decreased with increased feelings of menstruation as bothersome, there was more thought pertaining to convenience when reasoning for or against the reusable pad

compared to the sponge, where other codes such as *application* and *hygiene* and *safety* were the most common. In other words, consideration for the sponge's method of application as well as its safety in practice appeared to overrule consideration for how convenient this product may or may not be.

Although the current study showed a significant relationship between increased feelings of menstrual disgust/shame and decreased interest in the menstrual cup and reusable pad, these products' associated qualitative responses surprisingly did not reveal frequent concerns surrounding *hygiene*, *sanitation*, and *safety* as might be expected. In fact, this code was among the three least frequent codes for all four products studied. Regarding the menstrual cup and reusable pad, it may be that although feelings of disgust and shame toward menstruation are relevant, other aspects of these products overtake the rationale for or against their use. Interestingly, discussion of the *environment* or these products' *reusability* was among the top three most frequent codes for both the menstrual cup and reusable pad, both products whose related increased interest significantly correlated with all three environmental attitudes subscales in the current study. In other words, contrary to the findings of Lamont et al. (2019), participants with more pro-environmental attitudes showed more interest in the menstrual cup and reusable pad, and these findings were corroborated by the current study's qualitative responses associated with these products. These findings are interesting considering all four studied products are reusable, and the cup and pads represent opposing methods of menstrual fluid containment (collection versus absorption, respectively). Overall, it seems that although menstrual disgust and shame are related to disinterest in the menstrual cup and reusable pad, these products' reusability and relationship to the environment may be more contributory to the rationale behind feelings associated with these products.

Limitations

While data collected in regard to demographics seemed quite well-distributed, one limitation in this area was that the sample was predominantly White. A sample that is limited in this way produces results that are much less generalizable to a broader population.

Another major limitation of the current study was that it assessed correlation but not causation. In other words, it cannot be deduced that certain attitudes caused interest or disinterest in the unconventional menstrual products presented, only that there may be relationships present between certain variables. Relatedly, the results of this study may have been affected by priming or order effects in the way that survey questions were presented. Though it made sense for the product-related survey questions to be presented first in order to get participants' initial attention and before survey fatigue might set in, the order in which questions were presented may have influenced the way participants interpreted or responded to them. Thus, though the other variables were randomized to avoid order effects, there is still a possibility that such effects were present in the overall research.

Because qualitative data was collected in the study through open-ended feedback relating to products, some inferences could be made as to why individuals may or may not be interested in the products. However, one drawback to the use of qualitative data is the subjectivity in interpreting those very inferences that could be so useful in tandem with quantitative data. In other words, one person's interpretation of an open-ended response might differ entirely from that of another interpreter, and it could be the case that neither are able to deduce what the respondent truly was trying to convey.

Social desirability effects could also play a limiting role in the findings of this study. A survey can only deduce attitudes and intentions and not true behavior; what people report in a

survey to researchers showing interest in these topics might differ from the behaviors they would truly partake in of their own accord. This survey could be even more vulnerable to these effects because its topics are some in which people are likely to want to show their best selves. For example, one might falsely or exaggeratedly report pro-environmental attitudes because they feel it is socially desirable or expected of them to have concern and want the best for the environment, especially in its current state.

Future Research

Future studies might want to consider differing research designs to further replicate and enhance the findings of the previous and current research. For example, results may differ if participants are allowed or encouraged to interact with the product physically to form their reactions, rather than relying on a picture and short description. There may also be benefits to a design in which people are given the products to test the use of themselves, whether they are assigned or chosen; data such as this could provide the behavioral piece that is lacking in the current study. In other potential experimental designs, there could be manipulation of certain attitudes through intentional priming as compared to control groups in the measure of interest in unconventional menstrual products. It might then be inferable how correlations underlie causal effects. Additionally, future research could explore potential differences in the relationship between the current study's psychological variables and less intimate environmentally friendly products. Because menstruation is such a private experience, there may be significant differences in results regarding products that are more openly discussed and advertised.

Implications and Conclusion

Data collected from research like this might be useful or influential in literature and policy relating to important topics including environmentalism, eco feminism, eco consumerism,

etc., as it may highlight what can be done to increase interest in and use of environmentally friendly products. Specifically, this research contributes to the limited literature surrounding unconventional menstrual products, especially in the United States. Although pro-environmental behavior such as green consumption generally aligns with pro-environmental attitudes, especially in females (Lee, 2009; Mainieri et al., 1997; Zelezny et al., 2000), these attitudes have not been significantly correlated with interest in reusable menstrual products in the past (Lamont et al., 2019) and were only partially significantly correlated with interest in these products in the current study. Thus, this research also suggests that it could be beneficial to work toward reducing both negative menstrual attitudes and menstrual shame as it is possible that these variables are overpowering environmental attitudes and thus contributing to a barrier in the consumption of reusable products, especially those outside the norm.

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Table 1*Means and Standard Deviations of Variables*

Survey Scale	M	SD
Interest in Menstrual Cup	3.4	1.1
Interest in Menstrual Underwear	3.4	1.1
Interest in Reusable Menstrual Pads	2.9	1.1
Interest in Menstrual Sponge	2.1	0.9
Menstruation as Bothersome Subscale	5.7	0.9
Menstruation as Disgusting/Shameful Subscale	3.7	1.2
Self-Objectification*	0.9	14.1
Agency Subscale	4.5	1.4
Communion Subscale	7.9	1.1
Personal Conservation Subscale	5.7	0.9
Environmental Threat/Fragility Subscale	5.7	1.03
Altering Nature Subscale	4.7	1.1

*Note: $n = 267$

Table 2*Bivariate Correlations of Variables*

	1	2	3	4	5	6	7	8	9	10	11
1. Interest in Menstrual Cup	-	.209**	.276**	.355**	-.066	-.256**	-.016	.036	.067	.161**	.120*
2. Interest in Menstrual Underwear	.209**	-	.336**	.173**	-.045	-.060	.005	.017	.038	-.044	.009
3. Interest in Reusable Menstrual Pads	.276**	.336**	-	.384**	-.179**	-.165**	-.041	-.011	.057	.154*	.154*
4. Interest in Menstrual Sponge	.355**	.173**	.384**	-	-.121*	-.088	-.066	.062	.008	.068	-.070
5. Menstruation as Bothersome Subscale	-.066	-.045	-.179**	-.121*	-	.261**	-.043	-.056	.023	.009	.080
6. Menstruation as Disgusting/Shameful Subscale	-.256**	-.060	-.165**	-.088	.261**	-	-.066	.046	.058	-.121*	-.191**
7. Self-Objectification	-.016	.005	-.041	-.066	-.043	-.066	-	-.013	.037	-.036	-.076
8. Agency Subscale	.036	.017	-.011	.062	-.056	.046	-.013	-	-.017	-.090	-.171**
9. Communion Subscale	.067	.038	.057	.008	.023	.058	.037	-.017	-	.268**	.082
10. Personal Conservation Subscale	.161**	-.044	.154*	.068	.009	-.121*	-.036	-.090	.268**	-	.406**
11. Environmental Threat/Fragility Subscale	.120*	.009	.154*	-.070	.080	-.191**	-.076	-.171**	.082	.406**	-
12. Altering Nature Subscale	.183**	.091	.288**	.110	-.052	-.236**	-.004	-.195**	.105	.464**	.522**

Note: ** $p < 0.01$, * $p < 0.05$

Table 3a*Coding of Open-Ended Responses: Definitions, Examples, and Frequencies****Menstrual Cup***

Name of Code	Definition	Example	% Respondents ^a
Environment/Reusable	Relationship to environment or reusability of the product	“It’s reusable and therefore creates almost no waste...” “it is more sustainable...and therefore has a smaller environmental footprint”	30.9%
Efficacy	Product’s effectiveness in containing menstrual fluids; concern for leaks or messiness	“...possibility of it leaking or spilling...” “I have no fear of leakage with this.”	23.4%
Application	How the product is used (e.g., insertion, removal, etc.)	“...don't think I would like the process of inserting it and removing it...” “...they provide all the benefits of tampon usage...”	21.9%
Convenience	Ability to use product with minimal effort	“...seems like it would be more of a problem when used in public” “...do not have to change as frequently...”	20.4%
Maintenance	Upkeep of the product including washing, longevity, etc.	“...cleaning it while I'm out might be a hassle.” “...really like how low-maintenance it is...”	17.5%
Comfort	Physical feeling in use of the product	“...don't feel like it would be comfortable to wear throughout the day...” “More comfortable than tampons”	16.7%

Name of Code	Definition	Example	% Respondents ^a
Cost	Monetary- or investment-related remarks	“...I haven't made the leap to purchase yet.” “...cost-effective in the long-term...”	15.2%
Ease/Difficulty/Learning	Learning curve associated with use of the product	“...there's a bit of a learning curve at the beginning...” “ I am concerned that it would be difficult to use...”	14.5%
Hygiene/Sanitary/Safety	Hygiene, sanitation, cleanliness, or safety in use of the product	“...safer than tampons...” “...not sure how sanitary it would be”	10.8%
Flow	Product's use related to varying menstrual flows	“My periods are infrequent and light. I just don't need this much coverage.” “I think my period is too heavy.”	8.9%

Note: ^amore than one code may have been applicable to one response

Table 3b*Coding of Open-Ended Responses: Definitions, Examples, and Frequencies**Menstrual Underwear*

Name of Code	Definition	Example	% Respondents ^a
Comfort	Physical feeling in use of the product	“It would probably feel weird. Would it feel like a wet diaper.” “...they seem easy and comfortable.”	37.2%
Efficacy	Product’s effectiveness in containing menstrual fluids; concern for leaks or messiness	“...biggest concern would be the strength of the material absorption...” “...worry about leaking/stains...”	37.2%
Convenience	Ability to use product with minimal effort	“It would be easy to put on myself and make my life easier” “...better for when you're at home than when you're out and out.”	20.8%
Maintenance	Upkeep of the product including washing, longevity, etc.	“...I wouldn't want to have to wash this with my laundry.” “seem like they would last a while “	15.6%
Environment/Reusable	Relationship to environment or reusability of the product	“...environmentally friendly option...” “...seems lower waste/reusable...”	14.9%
Flow	Product’s use related to varying menstrual flows	“...those with heavy menstrual cycles may have leakage.” “...would likely save it for the last day or two of my cycle.”	14.9%

Name of Code	Definition	Example	% Respondents ^a
Application	How the product is used (e.g., insertion, removal, etc.)	“I am more of a tampon kind of girl...” “I like the fact that this is an external product.”	13.4%
Cost	Monetary- or investment-related remarks	“...product that saves me money...” “...hesitate because they are expensive.”	11.5%
Backup	Indication that the product would be better used in combination with another product rather than standalone	“I would use this in addition to other equipment. Like a fail safe.” “I would definitely use this as backup just in case my tampon leaked.”	10.8%
Hygiene/Sanitary/Safety	Hygiene, sanitation, cleanliness, or safety in use of the product	“...it seems unhygienic” “...not as sanitary as other products”	7.8%
Night	Indication that the product would be useful at night or when sleeping	“great for night time...” “...maybe I would try it for sleeping...”	4.8%

Note: ^amore than one code may have been applicable to one response

Table 3c*Coding of Open-Ended Responses: Definitions, Examples, and Frequencies****Reusable Pads***

Name of Code	Definition	Example	% Respondents ^a
Maintenance	Upkeep of the product including washing, longevity, etc.	“...have to deal with touching and cleaning it.” “...creating more laundry - especially extremely messy laundry.”	36.4%
Environment/Reusable	Relationship to environment or reusability of the product	“I’d love the reusability...” “...great environmentally friendly alternative for pads...”	35.7%
Convenience	Ability to use product with minimal effort	“...it would be annoying...” “Does not fit my lifestyle.”	24.9%
Application	How the product is used (e.g., insertion, removal, etc.)	“...I’ve never been a pad type of person.” “...wary though of the snap mechanism...”	21.6%
Efficacy	Product’s effectiveness in containing menstrual fluids; concern for leaks or messiness	“...wary of their absorbency...” “I worry about leaking.”	20.1%
Comfort	Physical feeling in use of the product	“...bulky and uncomfortable.” “...feeling just as noticeable and like a diaper?”	17.5%

Name of Code	Definition	Example	% Respondents ^a
Cost	Monetary- or investment-related remarks	“...they are usually out of my budget” “I would use it to save money.”	15.2%
Flow	Product’s use related to varying menstrual flows	“I have extremely heavy periods...” “I don’t need this much coverage.”	10.8%
Hygiene/Sanitary/Safety	Hygiene, sanitation, cleanliness, or safety in use of the product	“...sounds unsanitary.” “...doesn't seem very cleanly, hygienic or convenient...”	8.6%

Note: ^amore than one code may have been applicable to one response

Table 3d*Coding of Open-Ended Responses: Definitions, Examples, and Frequencies**Menstrual Sponge*

Name of Code	Definition	Example	% Respondents ^a
Application	How the product is used (e.g., insertion, removal, etc.)	<p>“...I'm not a huge fan of having to insert anything...”</p> <p>“...it doesn't have an applicator or string...”</p>	40.9%
Hygiene/Sanitary/Safety	Hygiene, sanitation, cleanliness, or safety in use of the product	<p>“...porous material often incites bacterial growth.”</p> <p>“I don't think it is sanitary and could lead to infection if stuck.”</p>	27.9%
Environment/Reusable	Relationship to environment or reusability of the product	<p>“I'm afraid of over-harvesting regardless (we're horrible about disrupting ocean life).”</p> <p>“...I love that it's biodegradable and natural.”</p>	22.7%
Efficacy	Product's effectiveness in containing menstrual fluids; concern for leaks or messiness	<p>“...looks totally unreliable.”</p> <p>“...would depend on how well they seemed to perform...”</p>	19%
Comfort	Physical feeling in use of the product	<p>“...look like it would scratch and be itchy”</p> <p>“...it looks painful and awkward sized.”</p>	16.7%

Name of Code	Definition	Example	% Respondents ^a
Maintenance	Upkeep of the product including washing, longevity, etc.	“...says it only lasts up to 12 months.” “...I would hate to wash that out...”	13.4%
Convenience	Ability to use product with minimal effort	“...I don't see it being convenient to store a dirty one in a purse or work bag.” “...isn't conducive to modern living.”	10%
Flow	Product's use related to varying menstrual flows	“...my period is always very heavy and these won't last me long probably” “I'd give it a shot on a lighter day toward the end of my period.”	2.2%
Cost	Monetary- or investment-related remarks	“...would not be priced well...” “...could be a potential long-term savings...”	1.5%

Note: ^amore than one code may have been applicable to one response

Appendix

Product Images and Descriptions

Participants viewed the following product images and descriptions before answering relative closed- and open- ended questions in the online survey. The products and their associated questions were presented in this order:

Menstrual Cup



Figure 1. Menstrual Cup

“Menstrual cups are cup-shaped devices, typically made of silicone, rubber, or latex, that are inserted into the vagina for the purpose of collecting menstrual blood. Average wear time before changing is said to be between 4 and 12 hours. Menstrual cups are washable and reusable, allowing them to be used repeatedly over a number of years.

One is encouraged to determine their individualized use of this product based on preference and necessity during their menstrual cycle; wear time can vary by brand and/or product specifications.”

Menstrual Underwear*Figure 2. Menstrual Underwear*

“Period underwear are worn like any other pair of underwear beneath clothing, acting as either a backup or total replacement for other menstrual products. Period underwear is most commonly made from absorbent, leak proof, moisture-wicking materials such as nylon, spandex, and cotton. A pair of period underwear can be worn up to a full day's length until changing into a new pair at night before sleeping. This type of product is washable and reusable, giving it the potential to be used repeatedly over a number of years.

One is encouraged to determine their individualized use of this product based on preference and necessity during their menstrual cycle; absorbency and wear time vary by brand and/or product specifications.”

Reusable Pad

Figure 3. Reusable Pads

“Reusable pads share the idea of a conventional pad; they are adhered to the inside of one’s underwear and act as a device to absorb menstrual blood. This type of pad is most commonly made from absorbent, leak proof, moisture-wicking fabric such as cotton, wool, or jersey, and includes a type of fastener such as a snap button to adhere it to underwear. They can either be purchased or made “DIY” style from available sewing patterns. Cloth pads are washable and reusable, allowing them to be used repeatedly over a number of years.

One is encouraged to determine their individualized use of this product based on preference and necessity during their menstrual cycle; absorbency and wear time vary by brand and/or product specifications.”

Menstrual Sponge



Figure 4. Menstrual Sea Sponge

“Menstrual sea sponges work similarly to the common tampon, minus the applicator and occasionally, the string. They are inserted into the vagina with the goal of absorbing menstrual blood. Sponges are plants harvested from the ocean, meaning they are naturally occurring and come in a variety of shapes and sizes. Menstrual sea sponges should be washed both before and after use, can be worn anywhere from 4 to 8 hours. This type of product could be used anywhere from 6 to 12 months before requiring replacement and is also biodegradable.

One is encouraged to determine their individualized use of this product based on preference and necessity during their menstrual cycle; absorbency and wear time vary by brand and/or product specifications.”