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Addressing plastic pollution through green consumption: Predicting intentions to use menstrual cups in the Philippines

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ABSTRACT

Plastic pollution is a global environmental crisis that poses a huge threat to the health of people and marine ecosystems worldwide. A significant source of plastic pollution is menstrual hygiene management, and an approach that can help address this crisis is the usage of washable and reusable menstrual cups. Using an extended theory of planned behavior model that includes self-identity and perceived quality, the study predicted intentions to use menstrual cups in the Philippines. Structural equation modeling results showed that perceived quality predicted attitudes towards menstrual cup usage. Moreover, attitudes, perceived behavioral control, and self-identity predicted intentions to use menstrual cups. There were also some differences in the factors and predictors of intentions between non-users and regular users of menstrual cups. Among regular users, perceived behavioral control did not predict intentions. These findings provide empirical support for the extended model, and provides insights for governments, non-government organizations, and corporations in promoting the usage of menstrual cups to address the global plastic pollution crisis.

1. Introduction

Plastic pollution is a global environmental crisis that poses a huge threat to the health of people and marine ecosystems worldwide (Salazar et al., 2022). As plastic products continue to be produced and used globally, marine plastic pollution becomes inevitable and plastic ingestion of marine organisms and humans is expected to worsen (Akanyange et al., 2022; Markic et al., 2020). Out of all the countries in the world, the Philippines has been identified as one of the biggest contributors to the global plastic pollution crisis. A study showed that the Philippines has the highest annual plastic emission to the ocean in the world (Meijer et al., 2021). Most of the plastic wastes from the country are disposable, single-use plastics (Paler et al., 2019) that are commonly used as packaging of products across different categories (Ang and Sy-Changco, 2007). As such, there is a strong need to understand and address the plastic pollution contributed by the Philippines (Aruta, 2021).

Menstrual hygiene management is one significant source of plastic pollution in the Philippines and the rest of the world. Menstruating people use an average of 10,000 sanitary products in their lifetime, so the use of conventional sanitary pads that are made of plastic and use

single-use plastic packaging generates a significant amount of plastic wastes (Stewart et al., 2009). Aside from plastic regulatory initiatives (da Costa, 2021), another approach that can help address plastic pollution from menstrual hygiene management is the usage of washable and reusable menstrual cups (Peter and Abhitha, 2021). However, the sales of menstrual cups in the Philippines pale in comparison to traditional sanitary pads, which may be partly lack of access as well as social norms in this religious and conservative country (Euromonitor International, 2021).

Most studies on menstrual cups have focused on their adaptability and safety, and the studies that explored predictors of its usage and examined them from a green or sustainability perspective are scant. As such, this study aims to predict intentions to use menstrual cups in the Philippines and to provide relevant insights for governments, non-government organizations, and corporations in promoting its usage, which can ultimately lead to a reduction in plastic pollution worldwide. The study used a non-experimental survey research design to test an extended Theory of Planned Behavior (Ajzen, 1991) model.

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2. Literature review

2.1. Menstrual cups

A menstrual cup is a device usually made of medical-grade silicone that is used for sanitary protection during menstruation (Kakani and Bhatt, 2017). Since their introduction into the global market several decades ago, various studies have focused on the acceptability and safety of menstrual cups. A systematic review and meta-analysis of studies on menstrual cups showed that they are safe to use, are highly acceptable, and have similar or lower leakage than disposable pads or tampons (van Eijk et al., 2019). Users like the convenience of the cups and that it allowed them to forget about their periods (Owen, 2022).

Apart from their advantages in terms of comfort and safety, menstrual cups have also been preferred for their reusability. Menstruating people, on average, use around 10,000 period products in their lifetime, so the use of washable and reusable menstrual cups significantly reduces wastes and expenses related to sanitary protection (Stewart et al., 2009). Specifically, the use of menstrual cups helps address the global plastic pollution crisis given that the conventional sanitary pads use single-use plastic packaging, are made of up to 90% plastic, and will take between 500 and 800 years before biodegrading (Peter and Abhitha, 2021; Pachauri et al., 2019).

In the Philippines, the sales of menstrual cups remain negligible compared to traditional sanitary pads (Euromonitor International, 2021). Although accessibility may be a critical factor for non-use, social norms and beliefs may likewise play a role. The country is predominantly Catholic and Filipinos are conservative, and the act of putting a foreign body inside the vagina may threaten traditional norms and cultural ideals such as fertility and virginity (Pokhrel et al., 2021; Stewart et al., 2009). As such, it is worth looking into the factors that influence usage of menstrual cups to help address the plastic wastes coming from the Philippines (Aruta, 2021; Euromonitor International, 2021; Meijer et al., 2021).

2.2. Menstrual cup usage as green consumption

Because of its potential in addressing plastic pollution, usage of menstrual cups may be considered as a pro-environmental behavior known as green consumption. Green consumption refers to the set of consumption behaviors of products and services that safeguard the environment in the long run (Testa et al., 2021; Joshi and Rahman, 2015). Such behaviors cover the whole process of purchasing, using, and disposing environment-friendly products that minimize the negative impacts on the environment (Yue et al., 2020).

Although green consumption usually involves behaviors with pro-environmental motivations, studies show that the consumption of environmentally-responsible products and services may also have non-environmental motivations (Peattie, 2010). Empirical studies have shown that green consumption may also be jointly driven by non-environmental motivations such as frugality (Naderi and Van Steenburg, 2018). Meanwhile, other studies focus on lower-impact consumption behaviors without environmental motivations such as following a vegetarian diet that is influenced by health and animal welfare concerns (Peattie, 2010). This shows that green consumption behaviors may or may not have pro-environmental motives.

The use of menstrual cups is an example of green consumption whose use may or may not have pro-environmental motivations. Aside from environment-friendliness, studies have shown that a menstrual cup is also used because it provides better leakage protection (Hyttel et al., 2017), it is economical as one cup can last for years (Stewart et al., 2009), and its versatility allows users to engage in different physical activities during their periods (Euromonitor International, 2021).

2.3. Predictors of menstrual cup usage

Numerous empirical studies have been done to identify the drivers of green consumption. In a systematic review of studies from 2000 to 2014, the two major determinants of green consumption that emerged were consumers' environmental concern and products' functional attributes (Joshi and Rahman, 2015). Green product attributes, specifically, had an effect on consumer behavior (Marcon et al., 2022). In another review of articles published from 2000 to 2018, Testa et al. (2021) were able to identify seven categories of the drivers of green consumption: 1) socio-demographic variables such as income and gender; 2) intrapersonal values connected to the environment, such as environmental awareness and ascription of responsibility; 3) intrapersonal values that are non-environmental, such as frugality and political orientation; 4) personal capabilities, such as perceived behavioral control and willingness to pay; 5) behavioral factors, such as habit and past consumption behavior; 6) product-related factors like perceived quality and brand trust, and; 7) context-related factors such as accessibility and social norms.

However, studies that explored factors that influence the usage of menstrual cups specifically are scant. In Taiwan, the factors that were associated with intentions to use menstrual cups were attitudes, subjective norms, perceived behavioral control, and sexual orientation and gender characteristic (Huang and Huang, 2019). Other factors that were found to influence usage intentions are age (Stewart et al., 2009) and belief in the cup's capability to prevent menstrual pain and leakage (Tembo et al., 2020). More studies are needed on the use of such menstrual products in the Philippines and the factors that influence it, as knowledge on these is currently very limited.

2.4. Pro-environmental theories

Several theories are available to predict green consumption behavior such as the use of menstrual cups. Some of these theories were developed specifically to explain pro-environmental behavior, such as the value-belief-norm theory of environmentalism (VBNT; Stern, 2000). The VBNT proposes that problem awareness depends on ecological world-views, which are influenced by biospheric, altruistic, and egoistic values. Problem awareness then leads to the activation of personal norms, which in turn influences behavior. There is a strong link between pro-environmental motives and behaviors since the VBNT "was developed on the basis of pro-environmental motives" (Han, 2020, p. 2817).

Meanwhile, the theory of green purchase behavior (TGPB; Han, 2020) extends the VBNT by adding image, attitudes, and social norms toward green purchase as predictors of personal norms, and also adding past behaviors as a predictor of green purchase behavior. However, both the VBNT and TGPB are limited only to studies on green consumption behaviors with pro-environmental motivations. As such, these are insufficient in predicting the usage of menstrual cups that may or may not have pro-environmental motivations.

2.5. Theory of planned behavior

The Theory of Planned Behavior (TPB; Ajzen, 1991) is a behavioral theory that is used to explain various kinds of behaviors, including green consumption. It states that attitudes towards a behavior, subjective norms, and perceived behavioral control influence the intention to perform the said behavior. Attitudes towards a behavior pertain to the overall evaluation of the behavior in terms of its costs and benefits, which may be favorable or unfavorable. Subjective norms refer to the perceived social pressure to comply with expectations to perform a behavior that comes from important people such as families and friends. Perceived behavioral control refers to people's perceived ability to perform a behavior.

Furthermore, performance of the behavior depends on both the intentions to perform it and the person's perceived behavioral control. The

TPB includes both environmental (attitudes) and non-environmental (subjective norms and perceived behavioral control) factors, which may explain why it's powerful in explaining green consumption (Steg and Nordlund, 2018). It has been extensively used to predict green consumption behaviors such as the purchase of energy-efficient lighting products (Apipuchayakul and Vassanadumrongdee, 2020), the purchase of green vehicles (Mohiuddin et al., 2018), and usage of menstrual cups (Huang and Huang, 2019). Fig. 1 shows a diagram of the TPB model.

Studies suggest that the factors in the TPB may predict intentions to use menstrual cups in the Philippines. In Southeast Asia, religious and cultural beliefs have posed challenges to menstrual hygiene management (Shrestha et al., 2020). Given that attitudes are shaped by beliefs (Ajzen, 1991), these challenges may extend to the use of a menstrual cup that is considered as a foreign body inside the vagina (Stewart et al., 2009). Peer support was also one of the primary drivers of menstrual cup adaptability (van Eijk et al., 2019; Hyttel et al., 2017), indicating the influence of subjective norms towards intentions to use such cups. Although there is growing interest in menstrual cups, its availability in the Philippines is still limited (Euromonitor International, 2021), which can affect the behavioral control of potential consumers. Another relevant aspect of behavioral control is the ability to carry out the behavior, and doubts in one's ability to use menstrual cups correctly is also a hindrance to their usage (Stewart et al., 2009).

2.6. Extended TPB model

Several studies have extended the TPB to increase the explained variance of behavioral intentions (Rise et al., 2010). The extended TPB models used in predicting green consumption included environment-related factors such as crisis awareness (Sun et al., 2022), environmental knowledge (Valentin, 2021), and environmental self-identity (Ateş, 2020), but not product-related factors which are major determinants of green consumption (Marcon et al., 2022; Testa et al., 2021; Joshi and Rahman, 2015). As such, this study used an extended TPB model that includes a wide range of non-environmental factors in order to integrate more categories of the drivers of green consumption (Testa et al., 2021).

To avoid developing extended models with indeterminate validity and generalizability, the criteria by O'keefe (2015) and Fishbein and Ajzen (2011) in adding predictors to the TPB were adapted. This study only considered factors that have been empirically shown to predict behavioral intentions toward green consumption. Moreover, only the factors that predict behavioral intentions of a wide range of consumption behaviors of various product types were considered. Lastly, the factors are behavior-specific, conceivably in a causal relationship with behavioral intentions, and distinct from the other predictors in the TPB. By following these criteria, the predictors that were added to the extended model are self-identity and perceived quality. Fig. 2 shows a diagram of the extended model.

Self-identity pertains to the "salient and enduring aspects of one's self-perception" (Rise et al., 2010, p. 1087). In a meta-analysis of studies that added self-identity to the TPB, self-identity was found to contribute

a significant increase in the explained variance of behavioral intentions after controlling for TPB components (Rise et al., 2010). Moreover, self-identity was able to predict a wide range of behavioral intentions. Self-identity predicted pro-environmental intentions and behaviors (Shang and Wu, 2022; Ateş, 2020), and green consumption behaviors such as purchasing organic milk (Carfora et al., 2019). It also predicted consumption of non-green products such as cigarettes (Moan et al., 2005). Furthermore, sexual orientation and gender characteristics are associated with intentions to use menstrual products like tampons and menstrual cups (Huang and Huang, 2019; Chang et al., 2015). Lastly, the use of such cups in the Philippines is forecasted to grow because they allow users to be active and engage in physical activities during periods (Euromonitor International, 2021), so those with athletic or sporty identities may be more inclined to use such cups.

Perceived quality refers to the consumer's overall evaluation of the superiority of a product (Zeithaml, 1988). Perceived quality predicted intentions to consume green products (Konuk, 2018; Ariffin et al., 2016; Chen and Chiu, 2016) and Southern lifestyle brands (Parks, 2018). Moreover, product-related attributes have also been cited as one of the primary reasons for considering the use of menstrual cups (Stewart et al., 2009). Meanwhile, perceived quality was a predictor of attitudes towards consumption of Southern lifestyle brands (Parks, 2018) and green products (Chen and Chiu, 2016). As such, the extended model added perceived quality as a predictor of behavioral intentions and attitudes.

2.7. Research problems

Most studies on menstrual cups have focused on their adaptability and safety, and the studies that explored predictors of its usage and examined them from a green or sustainability perspective are scant. This study aims to fill this gap by examining factors that influence intentions to use menstrual cups using an extended TPB model guided by green consumption literature. First, the study seeks to use the data from all participants in testing the model, given that the model aims to predict intentions to use menstrual cups regardless of their current usage behaviors. Moreover, this study aims to look deeper into the patterns among non-users and regular users of menstrual cups to explore possible similarities and differences with the aggregated data and offer nuanced explanations for such. Specifically, this study is guided by the following hypotheses:

- H1. Perceived quality predicts attitudes towards using menstrual cups.
- H2. Perceived quality predicts intentions to use menstrual cups.
- H3. Attitudes towards using menstrual cups and self-identity predict intentions to use menstrual cups.
- H4. Subjective norms predict intentions to use menstrual cups.
- H5. Perceived behavioral control predicts intentions to use menstrual cups.
- H6. There are differences in the factors and the predictors of intentions to use menstrual cups between non-users and current regular users.

3. Method

3.1. Design

The study used a non-experimental survey research design. Data was gathered through an online survey hosted on Google Forms. The preliminary parts of the questionnaire contained an image of a typical menstrual cup with the caption "This questionnaire refers to typical menstrual cups that are washable/reusable and made of soft silicone" that provided a reference point when answering the items, and the background and screening questions for eligible participants. Prospective participants who were ineligible for the study were not allowed to proceed. The succeeding parts contained randomly-ordered items indicating the six

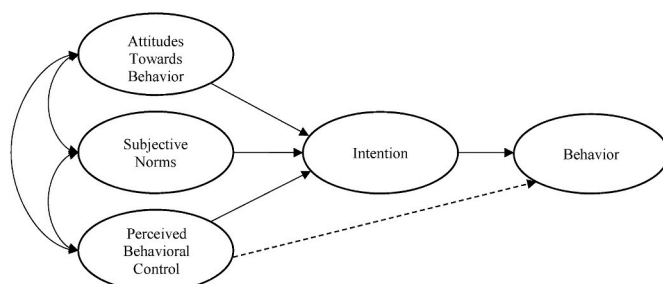


Fig. 1. The theory of planned behavior model (Ajzen, 1991).

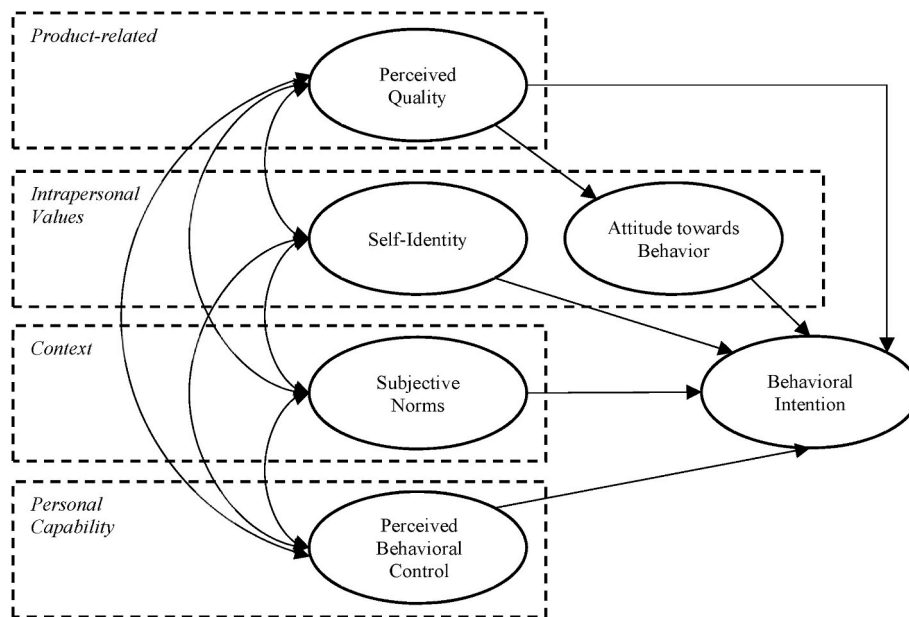


Fig. 2. An extended TPB model in predicting intentions to use menstrual cups.

factors included in the extended model.

3.2. Participants

The participants of the study were 1043 menstruating adults in the Philippines between the ages of 18 and 42 ($M = 24.05$, $SD = 4.39$). 84.28% of the participants have already used menstrual cups, while 15.72% haven't. In terms of their monthly household income, 15.82% had less than US\$ 185, 18.70% had between US\$ 185–370, 28.19% had between US\$ 370–745, 16.01% had between US\$ 745–1,305, 10.26% had between US\$ 1,305–2,235, 4.60% had between US\$ 2,235–3,730, and 6.42% had more than US\$ 3,730. Majority of the participants had monthly household incomes that are between US\$ 185–1,305, which is similar to the national distribution in 2018 (Albert et al., 2020). All participants are residing in the Philippines, have regular menstrual periods, and are familiar with menstrual cups. None of them are currently breast-feeding nor have active vaginal/urogenital infections.

3.3. Measures

Participants were asked to rate the extent to which they agree/disagree with 30 items that indicate the six factors in the extended model using a 7-point Likert scale (ranging from 1 = “Strongly disagree” to 7 = “Strongly agree”). The items were phrased in such a way that allows participants to respond with pro- and/or non-environmental motivations in using menstrual cups.

3.3.1. Attitudes towards the behavior (ATB)

Items adapted from the Attitudes scales of Carfora et al. (2019) and Mohiuddin et al. (2018) were used as indicators of ATB. Participants were asked to respond to 5 items (e.g., “I like the idea of using a menstrual cup”). The Cronbach's α was 0.79.

3.3.2. Subjective norms (SN)

Items adapted from the Subjective norms scales of Carfora et al. (2019) and Mohiuddin et al. (2018) were used as indicators of SN. Participants were asked to respond to 5 items (e.g., “My family thinks that I should use a menstrual cup”). The Cronbach's α was 0.58.

3.3.3. Perceived behavioral control (PBC)

Items adapted from the perceived behavioral control scales of

Mohiuddin et al. (2018), Yadav and Pathak (2017), and Tan et al. (2017) were used as indicators of PBC. Participants were asked to respond to 5 items (e.g., “I can easily use a menstrual cup whenever I need it”). The Cronbach's α was 0.81.

3.3.4. Self-identity (SI)

Items adapted from the self-identity scales of Obschonka et al. (2015), Moan et al. (2005), and Terry et al. (1999) were used as indicators of SI. Participants were asked to respond to 5 items (e.g., “Using a menstrual cup fits well into the image that I have of myself”). The Cronbach's α was .87.

3.3.5. Perceived quality (PQ)

Items adapted from the perceived quality scale of Parks (2018), Konuk (2018), and Wu and Chen (2014) were used as indicators of PQ. Participants were asked to respond to 5 items (e.g., “My impression is that menstrual cups are effective”). The Cronbach's α was 0.72.

3.3.6. Behavioral intentions (INT)

Items adapted from the intentions scales of Carfora et al. (2019) and Gan and Wang (2017) were used as indicators of INT. Participants were asked to respond to 5 items (e.g., “I intend to use a menstrual cup during my next period”). The Cronbach's α was 0.93.

3.3.7. Current usage behavior

This study developed items to indicate the current usage of menstrual cups. Participants were asked to respond to 6 items (e.g., “A menstrual cup is my go-to period product”) using a 7-point Likert scale (ranging from 1 = “Never” to 7 = “Always”). Participants whose responses to all 6 items were greater than 4 were considered as regular or high frequency users of menstrual cups.

3.3.8. Background variables

Background variables include monthly household income (income ranges; Albert et al., 2020) and previous experience with menstrual cups (yes, no).

3.4. Data collection procedures

3.4.1. Research ethics

The Ateneo de Manila University Research Ethics Committee

(AdMUREC) granted a research ethics clearance to this study. To ensure that the study adheres to ethical standards in conducting research, several measures were implemented. The informed consent form was integrated to the online questionnaire, which contained relevant information about the research such as the contact information of the researcher and adviser, the title and purpose of the research, the procedures involving the participants, the expected duration of participant involvement, the potential risks and benefits of participating in the study, and the rights of participants. If the participants fully consent to participate, they provided their active consent by proceeding to the next page of the questionnaire. A link to a downloadable copy of the informed consent form was shown to the participants after they have finished answering the questionnaire.

3.4.2. Pre-testing

The questionnaire was pre-tested to improve the wording of confusing items and the reliability of scales. Participants of the pre-test were asked to fill out an online form where they can provide their qualitative feedback on the clarity of the instructions and items used in the questionnaire. Furthermore, the pre-test provided an estimated duration in answering the questionnaire and pilot results in testing the extended TPB model. A total of 35 pre-testers who met the inclusion and exclusion criteria of the study were recruited. Based on the feedback from the pre-test, the structure of the questionnaire was modified and some items were revised to further contextualize them for the study.

3.4.3. Recruitment

Calls for participants were posted publicly on the social media websites Facebook and Twitter in November 2021. The calls included a poster that stated a short introduction of the author, the inclusion and exclusion criteria of the study, the link to the questionnaire, and the raffle mechanics. The call was also shared in the *Quarantine Tribute Tips* and *Menstrual Cup Users Philippines* Facebook groups, which has approximately 50,000 members each.

3.5. Data analysis procedures

Reliability and exploratory factor analysis (EFA) were performed on all six factors included in the extended model via SPSS version 23. Meanwhile, structural equation modeling was performed via EQS version 6.4.

Multivariate normality was assessed using Mardia's normalized estimate (Mardia, 1970). The normalized estimate of 358.27 exceeds five, which indicates multivariate non-normality.

Participants whose responses are conflicting were removed, such as those who reported having no previous experience of using menstrual cups but responded with high usage behaviors (greater than 4). Likewise, participants who answered using one or two ratings only (1 and/or 7) from the 7-point Likert scale were excluded. Negatively-worded items were also reverse coded prior to the analyses. Some items were dropped from the structural equation model to achieve good fit. EFA with a fixed factor of 1 was performed for each factor, and items with factor loadings of less than 0.40 were removed. Furthermore, Cronbach's α was computed for each factor to identify items that will improve the reliability if deleted. Three items were retained for each factor.

Structural equation modeling using a maximum likelihood (ML) method with robust methods correction were performed (Savalei, 2014). The fixed parameters for the factors were the items with the highest loadings from the EFA. The endogenous factors were ATB and INT. Meanwhile, the exogenous factors were SI, SN, PBC, and PQ. Model identification was not a problem since $p^* = 171$ (based on 18 variables) exceeded $q = 50$ (based on 20 equations, 24 variances, and 6 covariances) (Hair et al., 2014). The indicators of goodness-of-fit are the Satorra-Bentler χ^2 probability, the comparative fit index (CFI), and the Root Mean-Square Error of Approximation (RMSEA), and these were compared to cutoff values depending on the multivariate non-normality

of the data, the size of the sample, and the complexity of the model (Hair et al., 2014). Independent samples t-tests were also performed to compare the non-users and regular users of menstrual cups in terms of the six factors.

4. Results

4.1. Measurement model

The SEM using an ML method with robust methods correction generated a Satorra-Bentler $\chi^2 = 437.90$, $df = 123$, $p < .001$, $CFI = 0.91$, and $RMSEA = 0.05$, indicating adequate goodness-of-fit (Hair et al., 2014). All items significantly loaded to their respective factors. Moreover, four paths and six covariances were significant.

Table 1 shows the standardized factor loadings of the measurement model. The loadings of the items were all above 0.50. Three items loaded each on all six factors, and there was no cross loading. For each factor, the Cronbach's α , AVE, and CR were all above 0.70, 0.50, and 0.70 respectively. These results indicate construct validity of the measurements used in the model.

4.2. Structural model

Fig. 3 shows the structural model with the standardized path coefficients, R^2 , and correlations.

Results show that PQ significantly predicts ($\beta = 0.86$) and explains 74% of the variation of ATB. PQ is a strong, positive predictor of ATB, which implies that attitudes towards using menstrual cups is high when the perceived quality of menstrual cups is also high.

Results also show that ATB ($\beta = 0.28$) and SI ($\beta = 0.34$) significantly predict INT. ATB is a weak, positive predictor of INT, which implies that intention to use menstrual cups is high when attitudes towards using menstrual cups is also high. Meanwhile, SI is a moderate, positive predictor of INT, which implies that intention to use menstrual cups is high when the congruence of one's self-identity with using menstrual cups is high.

Meanwhile, the findings show that PQ ($\beta = -0.25$) and SN ($\beta = -0.03$) did not significantly predict INT. These imply that when the scores for PQ and SN are high, the scores for intentions to use menstrual cups may or may not be high.

Results also show that PBC significantly predicts INT ($\beta = 0.66$). PBC is a strong, positive predictor of INT, which implies that intention to use menstrual cups is high when the perceived behavioral control in using menstrual cups is also high.

Furthermore, results show that the best predictor of INT is PBC ($\beta = 0.66$), followed by SI ($\beta = 0.34$), and ATB ($\beta = 0.28$). These predictors explain 85% of the variation of INT.

4.3. Differences between non-users and regular users of menstrual cups

The participants were categorized into non-users and regular users based on their previous and current usage behavior of menstrual cups. The SEM among non-users generated a Satorra-Bentler $\chi^2 = 184.82$, $df = 123$, $p < .001$, $CFI = 0.96$, and $RMSEA = 0.06$, indicating good model fit (Hair et al., 2014). Meanwhile, the SEM among non-users generated a Satorra-Bentler $\chi^2 = 216.11$, $df = 123$, $p < .001$, $CFI = 0.90$, and $RMSEA = 0.03$, indicating adequate goodness-of-fit (Hair et al., 2014). The extended TPB model holds between the two groups, indicating measurement invariance (Putnick and Bornstein, 2016).

Table 2 shows a comparison of non-users and regular users of menstrual cups in terms of the R^2 of endogenous factors, the mean and standard deviation of the factors, and the standardized coefficients for each path. It also includes the t -scores of the differences in the factors between non-users and regular users.

The results of the independent samples t-tests show that the scores in all six factors were significantly lower among non-users.

Perceived quality predicted attitudes towards using menstrual cups

Table 1
Summary of measurement model standardized factor loadings.

Factor	Item	Factor Loading	Cronbach's α	AVE	CR
Attitudes towards the behavior	I like the idea of using a menstrual cup	.94	.91	.81	.93
	I feel good about the idea of using a menstrual cup	.92			
	The idea of using a menstrual cup is good	.83			
Behavioral intentions	I intend to use a menstrual cup during my next period	.95	.93	.83	.93
	I foresee that I will use a menstrual cup in my next period	.94			
	I want to use a menstrual cup whenever I have my period	.83			
	I can easily use a menstrual cup whenever I need it	.90			
Perceived behavioral control	I have the knowledge and ability to correctly use a menstrual cup	.77	.83	.64	.84
	I have the resources to use a menstrual cup for periods	.72			
	Menstrual cups are reliable in my view	.82			
Perceived quality	My impression is that menstrual cups are effective	.80	.72	.52	.76
	I believe the quality of menstrual cups is stable and consistent	.50			
	I see myself as a person who uses a menstrual cup	.83			
Self-identity	Using a menstrual cup fits my self-concept	.83	.86	.68	.86
	Using a menstrual cup fits well into the image that I have of myself	.81			
	My family thinks that I should use a menstrual cup	.85			
	People who are important to me want me to use a menstrual cup	.81			
Subjective norms	People who are close to me approve the use menstrual cups	.64	.81	.60	.81

among non-users and regular users. However, perceived quality explained a notably lower percentage of the variance of attitudes among regular users ($R^2 = 0.31$) than the non-users ($R^2 = 0.81$).

Meanwhile, attitudes towards using menstrual cups significantly predicted intentions to use menstrual cups among non-users ($\beta = 0.40$) and regular users ($\beta = 0.60$). Moreover, perceived behavioral control was a significant predictor of intentions to use menstrual cups among non-users ($\beta = 0.63$), but not among regular users ($\beta = 0.40$). Subjective norms, self-identity, and perceived quality did not predict intentions to use menstrual cups in both non-users and regular users. In both groups, the predictors explained a high percentage of the variance of intentions.

5. Discussion

Overall, the findings provide empirical support in predicting intentions to use menstrual cups using the extended TPB model. Results support H1 that says perceived quality predicts attitudes towards using menstrual cups. Perceived quality was a significant predictor of attitudes, which is consistent with findings of previous studies on green consumption (Chen and Chiu, 2016).

However, the findings only partially support H2 that says perceived quality predicts intentions to use menstrual cups. The result that perceived quality did not directly predict intentions contradicts the findings of previous studies on green consumption (Konuk, 2018; Ariffin et al., 2016). This may be because the models used in these previous studies did not include attitudes that fully mediated the relation between perceived quality and intentions, making perceived quality an indirect predictor of intentions.

The findings also support H3 that says attitudes towards using menstrual cups and self-identity predict intentions to use menstrual cups. The result showing that attitudes predicts intentions is aligned with the TPB (Ajzen, 1991) and supports the findings of a similar study on menstrual cups (Huang and Huang, 2019). Meanwhile, the finding that self-identity predicts intentions supports the findings of previous studies on pro-environmental behaviors (Ateş, 2020; Carfora et al., 2019) and consumption of non-green products (Moan et al., 2005). Combined, these findings confirm intrapersonal values as one of the categories of drivers of green consumption (Testa et al., 2021).

On the other hand, results did not support H4 that says subjective norms predict intentions to use menstrual cups. That is, intentions to use menstrual cups are not influenced by social pressure from important people like family and friends, which mirrors the findings of a green consumption study from India (Paul et al., 2016). Out of all the factors in the model, subjective norms was scored the lowest, indicating negative social pressure against the usage of menstrual cups. One explanation for this might be the conservative culture in the Philippines. The insertion of cups into one's vagina goes against traditional norms and threatens several cultural ideals such as fertility and virginity (Pokhrel et al., 2021; Stewart et al., 2009). This is also evident in the negligible sales of tampons that have been around much longer still compared to traditional sanitary pads (Euromonitor International, 2021). Another explanation is that because menstrual cups are fairly new, current users may be considered early adopters as their mothers were not exposed to menstrual cups growing up.

Despite the lack of subjective norms, intentions to use menstrual cups among the participants remained high. It is possible that the perceived benefits of menstrual cup use for the self, environment, or the society outweigh the costs of going against social norms. In addition, because menstrual hygiene management is a personal matter, other people wouldn't know what menstrual product one is using. This further reduces the risks of non-conformity. Still another possible explanation for emergent use is the feminist and women's rights movement in the Philippines that seeks to give women more control over their own bodies (Hega et al., 2017).

The results also provide support for H5 that says perceived behavioral control predicts intentions to use menstrual cups. The finding that perceived behavioral control predicts intentions agrees with the TPB (Ajzen, 1991), supports the findings of a previous study on menstrual cups (Huang and Huang, 2019; Stewart et al., 2009) and plastic use reduction (Aruta, 2021), and affirms personal capability as one of the categories of drivers of green consumption (Testa et al., 2021). Perceived behavioral control is also the strongest predictor of intentions among all predictors in the model, which is similar to previous empirical studies on green consumption (Ateş, 2020; Carfora et al., 2019).

Lastly, the findings support H6 that says there are differences between non-users and regular users. First, the results show that all six factors had lower scores among the non-users, which explains why their current usage behavior is low in accordance with the TPB (Ajzen, 1991).

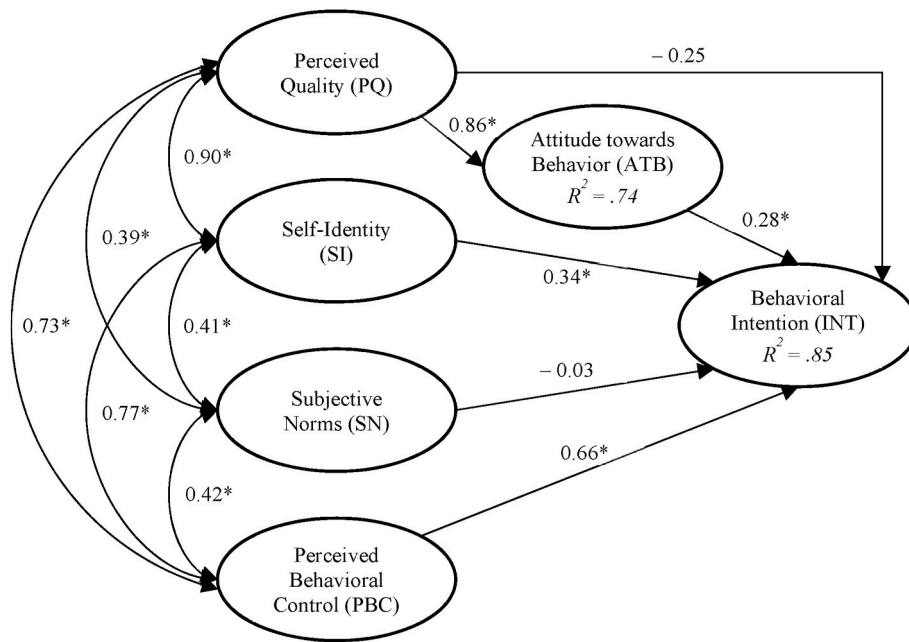


Fig. 3. Structural model with standardized coefficients.

Table 2
Summary of differences between non-users and regular users of menstrual cups.

Endogenous Factor	Non-users (N = 164)			Regular Users (N = 742)			t
	R ²	β	M (SD)	R ²	β	M (SD)	
Attitudes	.81		5.96 (1.40)	.31		6.96 (0.15)	-9.13*
Perceived Quality		0.90*	5.83 (1.06)		0.56*	6.69 (0.48)	-10.04*
Intentions	.86		4.67 (1.81)	.75		6.96 (0.17)	-16.25*
Attitudes		0.40*	5.96 (1.40)		0.60*	6.96 (0.15)	-9.13*
Subjective Norms		-0.03	3.43 (1.44)		-0.07	4.61 (1.35)	-9.99*
Perceived Behavioral Control		0.63*	4.19 (1.38)		0.40	6.81 (0.36)	-24.04*
Self-Identity		0.46	5.19 (1.59)		0.04	6.70 (0.55)	-12.03*
Perceived Quality		-0.47	5.83 (1.06)		0.01	6.69 (0.48)	-10.04*

Note. *p < .05.

Moreover, the results also showed that there are differences in the predictors of intentions to use menstrual cups between non-users and regular users. Specifically, perceived behavioral control was a significant predictor of intentions among non-users, but not among regular users. This may be because those who are regular users already had access to and demonstrated their ability to use menstrual cups that it has become irrelevant in the formation of intentions to continue using the cups. Attitudes were the only significant predictor of intentions, and results also suggest that factors other than perceived quality may have influenced attitudes. Given that these participants are already using menstrual cups, factors such as trust (Konuk, 2018), satisfaction (Gan and Wang, 2017), and habit (Yuriev et al., 2020) may have influenced their attitudes, which in turn influenced their intentions.

6. Implications

This study contributes to the literature on factors that influence the use of menstrual hygiene products, specifically menstrual cups, particularly in conservative cultures such as the Philippines. Moreover, this study contributes to the literature on addressing plastic pollution because menstrual cup usage can help address the plastic pollution crisis. Theoretically, this study also contributes to the literature on models predicting menstrual cup usage as a green consumption behavior. The study provides empirical support for the extended TPB model that allows both pro- and non-environmental motivations, since the usage of menstrual cups provides benefits to the environment in the long run regardless of the motivation behind it. This study also provides some groundwork towards the development of a more comprehensive and integrated model that can be used to predict a wide range of green consumption behaviors.

On a practical level, the study shows that businesses can market menstrual cups by focusing on the factors that significantly predicted usage intentions. Since the model does not assume any motivations behind the usage of menstrual cups, the study suggests that businesses can market them to the general public, and not just to the pro-environmental market. Conversely, even without branding menstrual cups as green, businesses can still market those effectively as long as their marketing efforts put emphasis on the significant predictors of intentions to use menstrual cups. Aside from the environment-friendliness of the cups, businesses can also highlight their quality to further improve the attitudes towards the cups, leading to their usage. Likewise, businesses can align their branding with the self-identity of their target market. Marketing efforts can focus on activating the green identities of prospective users to strengthen their propensity towards using menstrual cups. Businesses can also emphasize the versatility of the cups for physical and water activities when targeting active and sporty prospective users. Among the budget-conscious, the value-for-money of menstrual cups due to their reusability could also be highlighted.

Given that PBC was the strongest predictor of the intentions to use menstrual cups among non-users, this study also suggests that the most effective way to increase its usage is by increasing the target consumer's perceived ability to use menstrual cups. One way to do this is to make it easier for non-users to obtain the cups by improving its accessibility.

Sellers could make their cups available in more retail stores, particularly supermarkets and drugstores where most period products are purchased (Euromonitor International, 2021). Those in the business of selling menstrual cups, particularly those with smaller operations and without wide distribution networks, can also make their cups available in e-commerce platforms that will grow in prominence in the next few years (Szász et al., 2022; Euromonitor International, 2021). For economic, environmental, and health purposes, the government can also assist in improving the accessibility of the cups. Governments can do that by lowering taxes or partially subsidizing the cost of menstrual cups to reduce the prices of cups being sold in the market, or by distributing them to places where the usage is low, such as far-flung areas or low-income communities.

Another way to improve perceived behavioral control is to provide more resources to allow non-users to correctly use menstrual cups. These resources could be in the form of graphic manuals or videos that provide easily understandable and step-by-step instructions in using the cups, free or affordable consultations with professionals such as government health workers to obstetrician-gynecologists, and communities or support groups of users of menstrual cups who could readily answer questions about using them. Realistic, tangible, and transparent representations of the vaginal area could also be utilized for public demonstrations or for privately practicing the act of inserting menstrual cups among potential users. On a wider scale, governments can also help achieve this by embedding menstrual hygiene management in the public education curriculum, particularly in the sex education of the youth.

It is worth noting, however, that since perceived behavioral control does not predict usage intentions among the regular users of menstrual cups, maintaining positive attitudes towards the use of menstrual cups is more effective in sustaining their current usage behaviors. This can be achieved by ensuring the quality of the cups being sold in the market, providing excellent after-sales service to their consumers, and validating their choice of menstrual product through marketing campaigns.

7. Limitations

The study has some limitations that should be noted. First, the extended TPB model was only tested in predicting intentions to use menstrual cups. Further empirical tests must be done to assess and establish the generalizability of the findings to other specific green consumption behaviors.

In terms of the methods, the participants were selected through convenience sampling via social media. As such, people who also meet the inclusion and exclusion criteria but had no access to the calls for participants did not have the chance to join the study. When community quarantine conditions and resources allow, probabilistic sampling coupled with face-to-face surveys may be utilized to improve the generalizability of this study's findings. The study was also limited to people in the Philippines, whose culture, income levels, and values may differ with other countries. As such, generalizing these findings to other contexts should be taken with caution.

Furthermore, the study only used cross-sectional data. No follow-up survey was done, so the extended TPB model was not able to incorporate intentions and perceived behavioral control as predictors of future behavior. Instead, the study assumes that the intention to use menstrual cups is an antecedent of actual usage. Only current usage behavior of menstrual cups was obtained, which served as the basis in categorizing the participants into two groups. Moreover, current usage behavior was measured through self-reports only. Future studies can do a follow-up survey and use more objective measures of menstrual cup usage, such as cup color change.

Data availability

The authors do not have permission to share data.

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