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The Effect of Health Consciousness on Reusable Bottle Behavior from the Theory of Planned Behavior Perspective

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Abstract

The use of reusable bottles is known to reduce reliance on single-used liquid containers at an individual level. However, the adoption of reusable bottles remains limited in many areas, despite the availability of external factors encouraging use. While health consciousness could influence the use of reusable bottles, it is unclear whether such a relationship is positive or negative. The present study aimed to identify the effect of health consciousness on reusable bottle behavior by proposing a conceptual model based on the theory of planned behavior. College students completed questionnaires regarding their on-campus use of reusable bottles for five school days. Results revealed that health consciousness did not influence intention. Nonetheless, the fitness indices showed an excellent model fit. Behavior was predicted by intention ($p < .001$), which was in turn determined by attitudes ($p < .001$), perceived norms ($p < .05$), and perceptions of control ($p < .001$). Examination of the antecedents of on-campus use of reusable bottles revealed important implications for designing effective behavioral interventions.

Keywords: *Planned Behavior Theory, reusable bottles, health consciousness*

Introduction

Encouraging people to use reusable bottles–and to use them regularly–is a promising way to reduce reliance on plastic bottles. However, the use of reusable bottles remains low in many areas despite the availability of external factors encouraging use (e.g. financial incentives or water refill stations). In Thailand at Chulalongkorn University for example, it was found that only 10% of respondents used reusable bottles on campus regularly (Environmental Research Institution, 2020). A similar pattern can be seen in the United States (Easley-Appleyard et al., 2011; Romero et al., 2018) and Europe (Manuroner, 2019). This highlights that the decision to use reusable bottles is not determined solely by external factors.

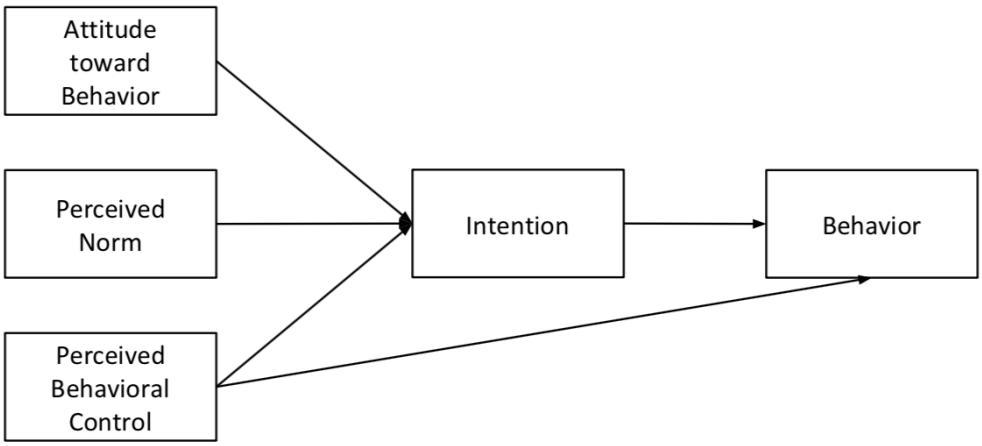
Previous research findings have suggested that health consciousness, the degree to which individuals are concerned about their health (Hong, 2009), can influence the use of reusable bottles. However, both positive and negative relationships have been found between health consciousness and reusable bottle behavior. On the one hand, people who are highly aware of their health may avoid using reusable bottles because they can act as a source of bacteria (Sun et al., 2017; Easley-Appleyard et al., 2011) and the components of reusable bottles, especially polyethylene terephthalate and bisphenol A, can be harmful to one's health (Halden, 2010). On the other hand, some highly health conscious people may use reusable bottles frequently because they enable control over water intake (Bhesyanavin & Pichalai, 2015). People have also reported that water in plastic bottles can be contaminated with chemicals (Yang et al., 2011), making reusable bottles a healthier choice. Due to the mixed evidence, the effect of health consciousness on the use of reusable bottles remains unclear.

To fill the knowledge gap, the present study aimed to identify the role of health consciousness on the use of reusable bottles, using the theory of planned behavior (TPB) as the framework. In particular, the present study examined the relationship between health consciousness and intention to use reusable bottles. The specific research questions posed were as follows. First, does health consciousness influence the intention to adopt reusable bottles? Second, in order to replicate prior work on the determinants of reusable bottle behavior (Ertz et al., 2017; Laner, 2018; Qian, 2018; Zhou, 2010), do the TPB variables influence adoption of reusable bottles?

The Theory of Planned Behavior

According to the TPB (Fishbein & Ajzen, 2011) (Figure 1), behavior is determined by intention and perceived behavioral control, while intention is influenced by attitude toward behavior, perceived norm, and perceived behavioral control.

Figure 1 *Theory of Planned Behavior Model*



Previous research has shown that the TPB can predict the use of reusable bottles (Ertz et al., 2017; Laner, 2018; Qian, 2018; Zhou, 2010). Intention was found to be a strong predictor of behavior, while attitude toward behavior, perceived norm, and perceived behavioral control had a significant effect on intention to use reusable bottles. Despite such consistent results, previous studies measured reusable bottle behavior in a general manner (e.g., "How often do you use the reusable bottles?") (Ertz et al., 2017; Laner, 2018; Qian, 2018; Zhou, 2010). It is highly unlikely that all respondents had the same idea of the location and time to use reusable bottles when completing the questionnaires (Lange & Dewitte, 2019), hence yielding inaccurate results. To minimize such problems, a context-specific measure of reusable bottle behavior was used in the present study.

Health Consciousness

Hong (2009) defined health consciousness as the degree to which individuals are concerned about their health. Health consciousness consists of three elements: self-health awareness, personal responsibility, and health motivation. Health consciousness has been well documented to predict both intention to engage in health behavior and environmental behavior (Akhondan et al., 2015; Buaprommee & Polyorat, 2016; Chen, 2013; Cho et al., 2014; Ellison et al., 2013; Gould, 1988; Kaynak & Eksi, 2011; Kraft & Goodell, 1993; Hong, 2011; Hwang & Cranage, 2015; Mai & Hoffmann, 2012, 2015; Melody & Shang-Hui, 2013; Royne et al., 2014; Singhal, 2017; Sinkevičius, 2016). For example, Chen (2013) found that people who had high health consciousness tended to have high intention to use functional foods. Melody and Shang-Hui (2013), as well as Kaur and Bhatia (2018), found that health consciousness predicted intention to purchase green products. However, certain behaviors that are less well-known in terms of their health impacts tended to have an insignificant relationship to health consciousness. For example, Hoque et al. (2018) did not find an effect of health consciousness on liquid milk consumption, as many people were not aware of harmful adulteration during certain processes of liquid milk production (Chanda et al., 2012; Islam et al., 2018).

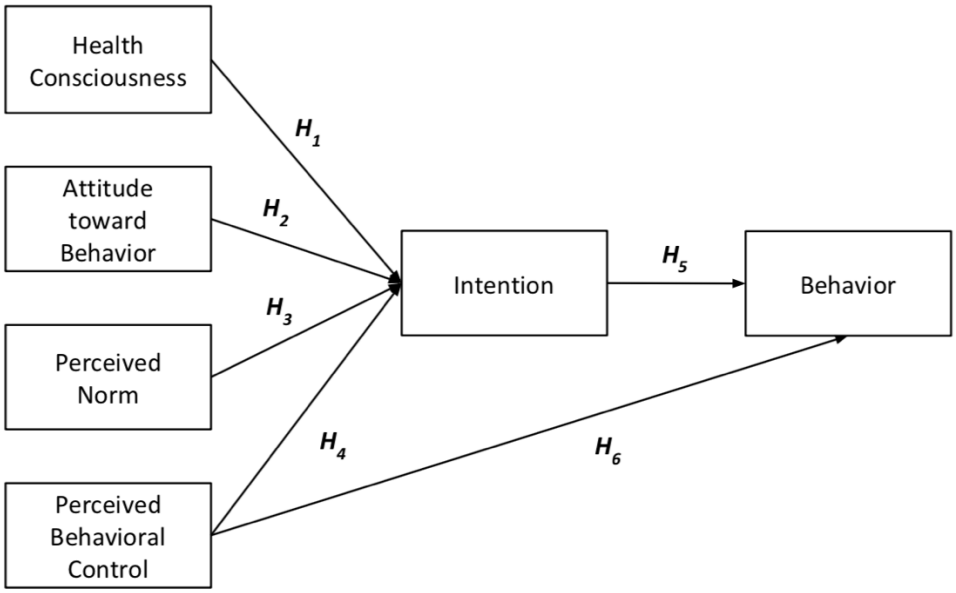
As discussed previously, past evidence has shown that people have health concerns over the use of reusable bottles (Appleyard et al., 2011; Bhesyanavin & Pichalai, 2015; Easley-Halden, 2010; Sun et al., 2017; Yang et al., 2011). It stands to reason that the use of reusable bottles can be seen as a health behavior. Thus, health consciousness should predict individuals' intention to use these bottles.

The Present Study

The present study investigated the role of health consciousness on the use of reusable bottles using the TPB. The conceptual model used is shown in Figure 2. All variables were assumed to be observed variables. The hypotheses generated were as following:

H_1: Health consciousness predicted the intention to use reusable bottles.
H_2: Attitude toward behavior predicted the intention to use reusable bottles.
H_3: Perceived norm predicted the intention to use reusable bottles.
H_4: Perceived behavioral control predicted the intention to use reusable bottles.
H_5: Intention predicted self-reports of the use of reusable bottles.
H_6: Perceived behavioral control predicted self-reports of the use of reusable bottles.

Figure 2 *The Conceptual Model*



Methods

Pilot Study

The TPB questionnaire was adapted from (Bhesyanavin & Pichalai, 2015). Items were adjusted in relation to the use of reusable bottles on campus over the next five school days.

Following the translation and validation guidelines proposed by Sperber (2004), Hong's (2010) health consciousness scale was translated into Thai by two translators. Discrepancies between the two translations were discussed and adjusted to derive a Thai version of the health consciousness scale. This Thai version was then back-translated into English by another two translators. Discrepancies in the translation were discussed between the two translators before finalizing the English version of the scale. The back-translation was compared to the original using a 7-point scale by 30 English native speakers in terms of meanings and form. Items that scored below midpoint received a revision. Results indicated that all health consciousness measurement items scored above five, indicating high validity of the cross-cultural questionnaire.

Before conducting the study, a pretest was conducted to test the psychometric qualities of the TPB constructs and health consciousness with two sample groups of Chulalongkorn students. For a total of 60 students, Cronbach's alpha results ranged from .79 to .95, while the discriminant *t*-test indicated a significant difference between the means of the high and low groups. With 100 students, confirmatory factor analysis showed a model fit for each variable.

Data Collection

Chulalongkorn University, Bangkok, Thailand, has campus-wide water refill stations, incentives when making beverage purchases, and giveaway reusable bottles to students. Therefore, it was selected as an appropriate location to examine the effects of internal factors influencing the use of reusable bottles. All the undergraduate students were eligible to participate in the survey and 120 completed two questionnaires. The first questionnaire, administered in October 2018, assessed five predictor variables, while the second questionnaire obtained self-reports of on-campus use of reusable bottles and was administered one week after the participants completed the first questionnaire. To generate a unique identifier to match the two questionnaires, the students were asked to add the last three digits of their identification numbers. Participants were assured of their anonymity.

Materials

The first questionnaire assessed the four constructs of the TPB and health consciousness. Participants were asked to respond to a series of questions in relation to the on-campus use of reusable bottles.

Health Consciousness. Responses to 10 questions were used as reflective indicators of health consciousness (e.g., "I am very self-conscious about my health"). Participants rated each item on a 7-point scale ranging from *strongly disagree* to *strongly agree.*

Attitude toward Behavior. Participants evaluated the common stem, "For me, using the usable bottle for the next five days on campus would be ...." on six, 7-point bipolar adjective scales, such as "*looks good/looks bad,*" "*proud/not proud,*" and "*pleasant/unpleasant.*" Responses were aggregated to yield a measure of attitude.

Perceived Norm. Responses to six questions were used as reflective indicators of perceived norms (e.g. "people who are important to me think that I should use the usable bottles on campus for the next five school days"). Participants rated each item on a 7-point scale ranging from *strongly disagree* to *strongly agree.*

Perceived Behavioral Control. The mean of six items was used to assess perceived behavioral control. Participants rated their preferences on a 7-point scale such as "to me, using the usable bottle on campus for the next five days is likely" (*strongly disagree* to *strongly agree*).

Intention. Intentions were assessed by computing the mean response to the following three items "I intend to use a reusable bottle on campus for the next five school days," "I am planning to use the reusable bottle on campus for the next five school days," and "I am willing to use the reusable bottle on campus for the next five school days." Responses were provided on a 7-point scale ranging from *strongly disagree* to *strongly agree*.

Behavior. One week after the first questionnaire was completed, the second questionnaire was administered containing one question to assess the behavior. Participants indicated how many days they had used reusable bottles on campus, with scores ranging from 0 (*never*) to 5 (*always*).

Statistical Analyses

The proposed model was tested by structural equation modeling (SEM) using LISREL 9.2. Each variable was treated as an observed variable. Model fit was assessed with sample size independent fit indices such as the comparative fit index (CFI), *p*-value, and the root mean squared error of approximation (RMSEA). According to conventional rules of thumb (Hu & Bentler, 1999; Kline, 2015), acceptable and excellent model fit was indicated by RMSEA values smaller than .08 and CFI, NNFI, and *p*-value greater than .90, .95, and .05, respectively.

Results

Descriptive Statistics

The response rate was 53.6%. There was no missing data. Respondents (N = 120, female = 70) reported moderately strong intentions to use reusable bottles on campus (M = 5.65, SD = .14), positive

attitude (*M* = 5.95, *SD* = .10), perceived norms (*M* = 5.47, *SD* = .09), perceived control (*M* = 6.21, *SD* = .09), and health consciousness (*M* = 5.78, *SD* = .09). Out of five days in the week, respondents reported relatively low frequency of using reusable bottles on campus (*M* = 2.20, *SD* = .18). All variables were significantly correlated with one another (Table 1).

Table 1 *Means, Standard Deviations and Correlations among All Variables*

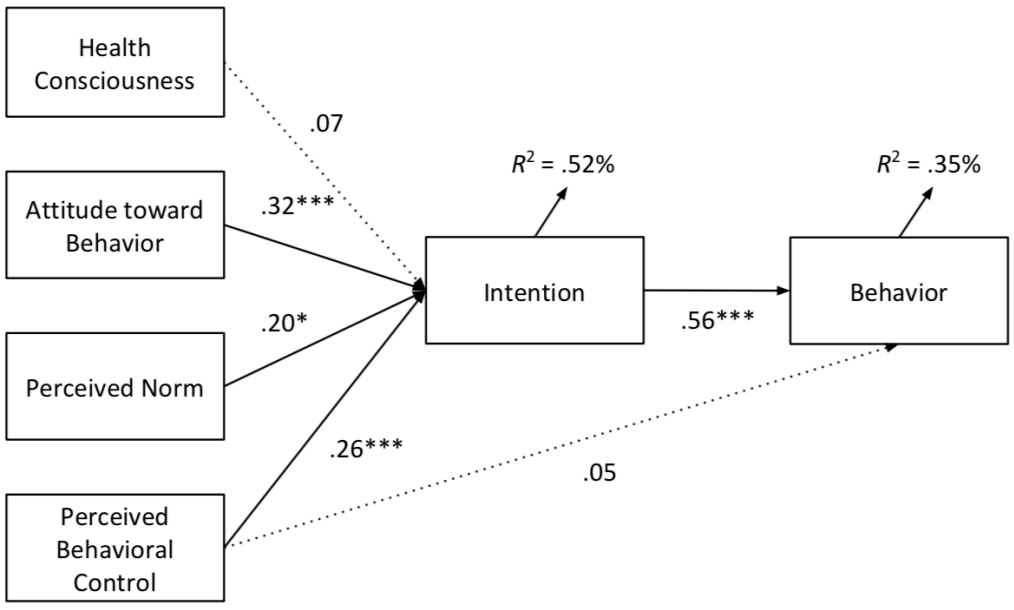
Variables	*M*	*SD*	HC	ATT	PN	PC	INT	BEH
1. Health Consciousness (HC)	5.78	.09	-	.50**	.49**	.57**	.47**	.25*
2. Attitude (ATT)	5.95	.10		-	.69**	.60**	.65**	.40**
3. Perceived Norm (PN)	5.47	.09			-	.60**	.61**	.35**
4. Perceived Control (PC)	6.21	.09				-	.61**	.39**
5. Intention (INT)	5.65	.14					-	.59**
6. Behavior (BEH)	2.20	.18						-

Note. * = $p < .05$ level, ** = $p < .01$ level, *** = $p < .001$

Testing the Conceptual Model

The fitness indices indicated that the model provided an excellent fit to the data: CFI = 1.00; NNFI = 1.02; RESEA = .00; $p = .85$. The model accounted for 52% of the variance in students' intentions and 35% of the variance in their reported on-campus use of reusable bottles (Figure 2). Intention had a strong direct effect on behavior (ß = .56, *SE* = .90, $p < .001$). However, perceived behavioral control did not have a direct effect on behavior (ß = .05, *SE* = .08, $p > .05$). The effects of attitude toward behavior (ß = .33, *SE* = .13, $p < .001$), perceived norm (ß = 21, *SE* = .14, $p < .05$), and perceived behavioral control (ß = .28, *SE* = .12, $p < .001$) on intention were moderate. Finally, health consciousness did not have an effect on intention (ß = .07, *SE* = .08, $p > .05$).

Figure 3 *Health Consciousness and TPB Variables Predicting On-campus Use of Reusable Bottles*



Note. * = $p < .05$ level, ** = $p < .01$ level, *** = $p < .001$; …. = non-significant; ___ = significant

Discussion

This study builds on prior literature suggesting that health consciousness predicts the use of reusable bottles (Bhesyanavin & Pichalai, 2015; Easley-Appleyard et al., 2011; Halden, 2010; Sun et al., 2017; Yang et al., 2011). A conceptual model was proposed under the TPB framework, in which intention mediated the effect of health consciousness on reusable bottle behavior. From the

Chulalongkorn student sample, health consciousness did not have an effect on intention to use the reusable bottle over five school days. Thus, H_1 was not supported. These results imply that concern over one's health does not have an effect on reusable bottle adoption. Another consideration that may help explain the insignificant finding is that health impacts from the reusable bottle usage, either beneficial or harmful, take time (longer than five days) to manifest. Sun et al. (2017), for example, found that over the course of seven days or longer with frequent usage, reusable bottles started to accumulate bacteria. Thus, future study should investigate such relationships over a longer period of time.

Consistent with previous studies (Ertz et al., 2017; Laner, 2018; Qian, 2018; Zhou, 2010), the results of this study confirmed the utility of a conceptual model as a framework for understanding the intention to use reusable bottles and behavior. Structural equation modeling revealed an excellent fit between the conceptual model and the data. Self-reported behavior is predicted by intention, which is in turn determined by attitude, perceived norms, and perceived behavioral control. Thus, H_2, H_3, H_4, and H_5 were supported. However, there is little variation on the degree to which each TPB variable had on intention, compared to previous studies. This could be due to the different populations being studied (Fishbein & Ajzen, 2011). In addition, the results also revealed that despite differences between context-specific and general measures of reusable bottle behavior, the TPB variables' relationship remained relatively similar, indicating the robustness of the TPB.

H_6 was not supported. The effect of perceived behavioral control on behavior was insignificant. According to Fishbien and Ajzen (2011), such an insignificant effect indicates that individuals underestimate how difficult it is to perform the altered behavior. In practice, the use of reusable bottles requires a series of behaviors, including bringing the reusable bottles with them and cleaning the reusable bottles after use. Respondents may not be aware of these subtle behaviors as part of the use of reusable bottles, leading to an overestimation of perceived behavioral control.

The present findings have implications for intervention design that aims to encourage the use of reusable bottles. Because intention has a strong effect of behavior, it is important to create conditions to motivate individuals' use of reusable bottles. To do so, intervention design should target individuals' attitude toward behavior, perceived norm, and perceived behavioral control, as they are significant determinants of intention. In particular, intervention should highlight the emotional and cognitive aspects of reusable bottle behavior, peers' reusable bottle behavior and opinions about reusable bottles, and individuals' control over reusable bottle behavior. The insignificant effect of health consciousness on intention implied that individuals did not have health concerns that would impact their intention to use reusable bottles. Thus, messages about health can be excluded.

One potential limitation of this study was its reliance on self-reported on-campus use of reusable bottles, and the possibility that participants may have overestimated the extent to which they adopted these socially desirable behaviors. This study was comparable in this regard to most other studies of reusable bottle behavior. Participants were assured that their responses were anonymous to mitigate the tendency toward social desirability responses. Another limitation was the relatively small sample size. Nonetheless, the sample size of this study met Shumacker and Lomax's (2010) rule of thumb of 20 cases per variable, and did indeed yield significant results as discussed previously. Future research should confirm the present findings with a larger sample size, following other guideline rules.

Conclusions

This study made a number of important contributions to our understanding of the use of reusable bottles. First, health consciousness did not have an effect on intention and behavior over a short period of reusable bottle usage. Second, the data revealed that the TPB was a suitable framework to study the use of reusable bottles. Third, compared to previous studies, the results showed that differences between context-specific and general measures of the reusable bottle behavior did not affect the relationship among TPB variables. Finally, the discussion above shows how the results of this study can provide useful guidance regarding factors to be considered when designing effective behavioral change intervention to encourage the use of reusable bottles.

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