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Bike-Sharing and Public Acceptance in Bangladesh: An Empirical View of Religiosity as an Obstacle for Women's Intention toward Bike-Sharing

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Abstract

This study aims to assess the impact of religiosity on female citizens based on the Theory of Planned Behavior (TPB) that finds the factors influencing the behavioral intention of them toward bike-sharing in Comilla, a city corporation in Bangladesh. A survey of 277 female citizens was conducted in a city corporation area of Bangladesh for data and to test the proposed model. Structural equation modeling (SEM) was used to analyze this study. The findings pointed out that attitude, subjective norm, and perceived behavioral control have significant positive impact on women's intention toward shared fleet of bike while religiosity influences female users' intention negatively. To the best of our knowledge, it is the first study which evaluated the effects of religiosity on female users' intention toward bike-sharing.

Keywords

Bike-Sharing, Theory of Planned Behavior, Religiosity, Female Users' Behavioral Intention, Structural Equation Modeling, Bangladesh

1. Introduction

Initiated by the Witte Fietsen in Amsterdam on July 28, 1965 [1], nowadays, bike-sharing is being accepted substantially in urban areas all over the world even though it is comparatively a new mode of transportation in cities and towns [2]. The effect of climate change and the boasted anxiety about worldwide transportation have headed to growing interest towards bike-sharing as an al-

ternative of sustainable transportation [3]. Various facts are associated with this increasing popularity of shared bike around the world namely environment friendly, low costs, and healthful exercise. It lessens fuel consumption and traffic congestion, reduces stress and helps to lose weight [4] [5] and diminish environment hazardous gases [3], etc. It also cuts the travel time gap along with noise and air pollution, and increases the number of public transport ridership [6]. Although it is the widely and rapidly accepted travel mode in the developed countries along with some developing countries such as China, fewer acceptances are found in the Indian subcontinent and Middle East Asian countries. Bike-sharing has been adopted only in few urban areas in Bangladesh. However, no study is found on it yet.

This is the first study in Bangladesh to see the behavioral aspects that measure the intentions to take shared bike instead of their usual travel modes such as car, three wheeler taxi, etc., which is very important because to create a more livable urban life, sustainable travel behavioral arrangements are a precondition [7] [8]. To measure the factors related to intentions towards bike-sharing use is essential from the transport planning perspective. Very few issues are as challenging as transport planning for sustainable development of urban area [9]. Bike-sharing can be an effective measure in this case because it plays a role as competitor and complementary to the present transportation means such as car and other modes [10]. Since it can be used as a substitute of public transport system, a "green" mode of transportation, and relatively more advantageous than other modes, urban planners can take bike-riding system as a sustainable transit solution that also supports to protect eye-catching sites and historical conservation areas [9] [11]. Therefore, it is necessary to examine the factors that shape citizens' demand for bike-sharing systems to implement such a positive travel mode to the city dwellers.

Moreover, this is probably the first study that considered religiosity on behavioral intention toward bike-sharing. This phenomenon was chosen for some reasons. Firstly, although secularism was one of the fundamental principles of the constitution of The Peoples' Republic of Bangladesh, it was abolished in 1977 and replaced with Islam as "absolute trust and faith in Almighty Allah". Later, in 1988, Islam was established as the state religion (People's Republic of Bangladesh (1972). However, the Supreme Court of this country declared the restoration of "secularism" again in 2010 [12]. Moreover, present Bangladesh was with Pakistan during the partition of India in 1947 and the partition was only based on two religions (Hindu and Muslim) and Bangladesh was in Muslim majority side [13]. Therefore, Muslimism is a vital part of this area for a long period of time. Secondly, it is a country with Muslim majority (90.4%) [14] where the Islamic legislations are not only a major basis of social rules, but also Islam is a great source of administrative and constitutional laws. Muslim people have trust on their one and only God (Allah) as the most powerful and merciful creator. They believe that Allah wants his creations to abide by his written guidance (Holy Quran), and Hadith (Sunnah) from his nominated messenger, the last prophet of Islam,

Mohammed (PBH) [15]. That is why Muslims are submissive to Quran and Hadith, and the Muslim people of Bangladesh are renowned for their religiosity in the world. Thus, religiosity was preferred in this study.

Additionally, Muslim women are restricted to unveil themselves in front of common peoples except their bosom relatives such as husband, brother, father, son, paternal and maternal uncle, father-in-law etc. (The Qur'an 24:31, translated by Muhammad Asad) [16]. Therefore, the Muslim women are not supposed to go outside for bicycling and their dresses are also not suitable for use bicycles because of looseness and length; Muslim dress must cover the whole body of woman. Furthermore, it is an area of classical patriarchy where women feel themselves inferior to men and they are in a submissive position to men in the society [17]. Besides, religiosity is increasing gradually in Bangladesh and "wearing Islamic cloths is seen as anti-women and anti-empowerment" [18]. Hence, it is seems to be important to examine whether these trends have any influence on women's intention toward bike-sharing. Therefore, only female citizens were selected as respondents in this study.

While there are many studies on how shared bikes' schemes are transforming mobility in cities around the world, only few studies pointed out the impact of bike-sharing in smaller cities [4]. The aim of this present study is to examine women's intentions toward bike-sharing in a small city of Bangladesh with low rate of bicycle usage and no previous experience to use shared transportation initiatives. This paper intends to understand; 1) female users' intentions toward bike-sharing so that the policy makers may be helped if they seek to introduce it not as a last mile solution but as a "novel" concept in a smaller city like Comilla [7], Bangladesh, and, especially, 2) to identify whether there is any religious barriers to the female citizens of that city to use shared bikes. The analytical framework of this study is based on the Theory of Planned Behavior by Icek Azcen, 1991. It links behavioral intentions to attitudes, subjective norms and perceived behavioral control. Because there was no shared bike fleet in this small city during the study, respondents were requested to tick their intentions on the questionnaire if any bike-sharing scheme is launched in that area in the future.

Hereafter, a description of the research methodology, an analysis of the results, discussion of the main findings with conclusions and policy recommendations are given. It ends with limitations and future research directions.

2. Theoretical Framework and Research Hypotheses

2.1. Theory of Planned Behavior

The framework of this study was built upon the latent constructs of Theory of Planned Behavior [19]. The TPB is one of the most prominent and broadly held theoretical frameworks to predict human behavior [20]. In TPB model, attitudes, subjective norms, and perceived behavioral control are the three independent determinants that have great influence to settle human intentions and actions [19]. It is a suitable conceptual framework for various domains including trans-

portation to examine intentions and behaviors due to its flexibility and openness [21]. TPB is successful to predict and explain human behavior in health and food research area too [22]. So, since bicycling is a healthful exercise, TPB is suitable to use in this extent to. Moreover, it appears a very powerful model in explaining the environmental friendly behavior [23].

Many studies has been done in transportation or related fields based on TPB [24] [25]. But studies in bike-sharing using TPB are not so many. In existing literature, different scholars have focused on different variables using the original TPB. Various items were examined such as value and residual effects [26], past behavior, personal norm [27], and attractiveness of unsustainable alternatives [28], and technology acceptance model (TAM) with TPB etc. [29] [30]. Moreover, Kaplan *et al.* [11] used TPB in bicycle tourism. However, so far as we know, no study has been done yet on the influence of religiosity in bike-sharing system based on TPB. Since bike-sharing system is a rapidly spreading travel mode even in developing countries and some of them are Muslim majority, new research should be conducted focusing the influence of religiosity, especially on women's intention toward mobile bike-sharing system.

2.2. Proposed Research Model

To fill the gap mentioned above, religiosity is proposed as a predictor of intention besides original TPB constructs. **Figure 1** represents the proposed model with the hypotheses. TPB postulates that person's stronger intentions to perform an action require promising attitudes, favorable subjective norms, and greater perceived behavioral control. Among these predicting indicators of intentions, attitude is how much favorable or unfavorable judgment [19] a person has towards bike-sharing. More favorable attitude will lead an individual to perform more to a certain behavior [31]. If the outcomes are positively evaluated, the individual is likely to possess a favorable attitude towards that specific thing and, consequently, the person likes to do that behavior [19] [32]. Consumer attitude is very influencing psychological factor in transport use behaviors [24]. However, the effect of attitude has not been investigated so much in the field of bike-sharing. Nikitas [7] examined attitudes toward bike-sharing and found that it provides strong evidence of peoples' positive attributes to cycling as "an activity" and "a transport mode". Kaplan *et al.* [11] also found positive relationship of favorable attitudes and cycling. A moderating effect of attitude was also found positive to bike-sharing adoption intention in their study [29] [33]. So, H1 is proposed:

Hypothesis 1: Female citizens' attitudes are positively related to intention towards bike-sharing.

Subjective norms are the influences of friends and family towards using bike-sharing. Ajzen [19] defined it as "the perceived social pressure to perform or not to perform the behavior". These are often an influencing factor in individual's travel intentions and behaviors [24] [34]. Still there is scarcity of examinations between subjective norms and behavioral intentions in bike-sharing. Chen [29] investigated and found that there is a very powerful relationship between

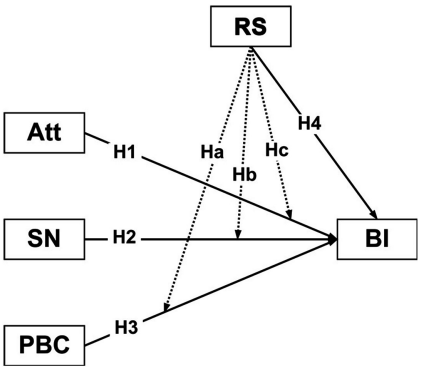

Figure 1. The proposed research model.

subjective norms and behavioral intentions. Kaplan *et al.* [11] suggested that peoples' subjective norms toward bicycling are stronger. But this relationship is for those who currently live in cycling-friendly countries, use bicycle daily and are both recreational utilitarian cyclist. Thus, H2 is proposed:

Hypothesis 2: Subjective norms are positively related to female citizens' intentions to use bike-sharing.

Perceived behavioral control is very important factor of the theory of planned behavior [19]. It is about the difficulty level a person thinks of a behavior to perform [35]. It "provides useful information about the actual control a person can exercise in the situation and can therefore be used as an additional direct predictor of behavior" [20]. Generally, under consideration, greater perceived behavioral control leads to stronger intention of an individual to perform a behavior [36] [37]. However, only a few research has investigate the perceived behavioral control on bike-sharing. Kaplan *et al.* [11] found that PBC is positively related to behavioral intention toward shared bike and holiday cycling. The effect of PBC has not been researched fully on bike-sharing. Therefore, H3 is proposed:

Hypothesis 3: Perceived behavioral control is positively related to female citizens' intentions to use bike-sharing.

2.3. Inclusion of Religiosity in TPB

Although there are three predictors of human intentions and behaviors, TPB model is open to add "additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behavior after the theory's current variables have been taken into account" [19]. Also, TPB failed to include some other necessary factors in this model [28] [36] [38]. In recent times, scholars emphasize on adding new constructs in TPB to improve the predictive power of the framework [31] [39] [40]. Thus, based on these literatures, this study aims to add religiosity in original TPB.

2.4. Theoretical and Empirical Support to Include Religiosity

Plenty of studies are there on the relationship among religiosity, psychology, ethics, subjective well-being, and social norms etc. Very few forces have been as

influential as religion in the history of mankind [41]. Most importantly, it is the basic category of human experience [42]. Existing literatures shows that practicing and regularly church going people have good physical and mental health [43] [44] [45]. Regular religious works also bring cheerfulness and satisfaction in one's life [46] [47]. Sedikides [48] says that religiosity is "an orientation, behavioral set, and lifestyle considered important by the large majority of people worldwide" and social and personality psychology cannot neglect it anymore. Worldwide, 85% of people report having at least some form of religious belief [49], and 82% report that religion constitutes an important part of their daily life [48]. So, it can be said that religious norms play a vital role in physiological process and moral decision making.

In addition, existing literature proved that religiosity has impact on attitude, subjective norm, and perceived behavioral control. If anyone strictly conforms to religious legislation, s/he is a good religious performer and likely to show ethically developed attitude [50]. Also, "Perceived religious norms are what one perceives the beliefs of his/her religious leaders to be" [51]. Religion is sustained through interaction and empowered for producing conformity to our norms [52]. Specially, religiosity is a strong influencing factor in all type of decision making in the Muslim world [53]. So, religiosity is strongly related to Muslims' attitude. In addition, in both social and organizational area, peoples' perceived behavioral control is related to religiosity [54] [55]. Therefore, religion and religiosity is highly linked with peoples' life cycle. Moreover, no prior study has been done on religiosity in TPB in bike-sharing field. That is why it was selected for this study and the following hypotheses are proposed:

Hypothesis 4: Religiosity is negatively related to women's intention towards bike-sharing.

Hypothesis a: Religiosity moderates the relationship between attitude and women's intention towards bike-sharing.

Hypothesis b: Religiosity moderates the relationship between subjective norm and women's intention towards bike-sharing.

Hypothesis c: Religiosity moderates the relationship between perceived behavioral control and women's intention towards bike-sharing.

2.5. Research Design and Data Methodology

2.5.1. Definition and Pictorial Presentation of Bike-Sharing

In the first page of the questionnaire, we set a definition of bike-sharing so that one can understand the concept easily. The definition is: "bike-sharing means the shared bicycles that one can access from some points of a city in rental stations or via mobile app for short-time use generally for a small cost. The short time may be used to reach from home to bus or taxi or railway station, from these stations to work place, and vice versa besides any other individual uses. Bike-sharing usually funded by government or private company, or both (private-public partnership). Research showed bike-sharing as healthful, inexpen-

sive, and environment friendly mode of transport all over the world". We also used some photographs of bike-share using in the USA, Europe, India, and China along with a photograph of female users' using bike-sharing.

2.5.2. Data Collection

The survey was implemented in Comilla City Corporation area which is one of the eight city areas of Bangladesh. We randomly selected it because it is a newly formed city corporation. In these new urban areas, city corporation authorities have opportunities to work on infrastructural development to make it more livable, resilient, and sustainable.

With the purpose of testing the hypotheses empirically, female citizens of the target area were invited to participate in this study from August 2018 to September 2018. An online questionnaire was administered via social media (Facebook, Messenger, Whatsapp, and IMO) and email. The questionnaire was created in www.docs.google.com/forms to collect data for this study and it was a confidential and anonymous. A total of 277 valid questionnaires were used for this study. But, there were 46 more questionnaires that were excluded due to the partial completion.

As shown in Table 1, demographic characteristics of the respondents are as follows: Among the total no. of 277 female respondents, most of the respondents were in 20 - 29 age groups (69.7%) and second most them were from <20 age groups that constitutes for 15.2%. A majority of respondent received bachelor degree (102 persons, 36.8%), followed by middle school (29.2%) and Masters (22.4%). The household monthly income of respondents was as follows in Bangladeshi Taka (I USD = 82 BDT): 30% (83) of respondents stated their family monthly income was less than 10,000 followed by 10,001 - 20,000 (24.9%), 20,001 - 30,001 (20.2%) and 30,001 - 40,000 (19.9%). Finally, it obvious that the respondents were primarily Muslim (85.9%) and some are Hindu (12.6%) and Buddha (1.4%). Furthermore, in response to the questions whether they know how to ride bicycle, and their thinking about the suitability of existing dress culture for cycling, 93% of the females said that they do not know bicycle riding and 73% of them told about the unsuitability of dress.

2.5.3. Measures

A total of 20 questions were asked. Among these 18 questions were for the constructs of the proposed model presented in Table 2. The 18 items were adapted from previous studies where all have been applied with sufficient validity. Attitude, Subjective Norm, and Perceived Behavioral Control: These three latent constructs of the Theory of Planned Behavior (TPB) were adapted and modified from Ã & Hsu [35]. A measure of four item scales for attitude, and three item scales each for subjective norm and perceived behavioral control were taken and rated on a seven-point Likert-type scale. The responses options for all 18 questions ranged from 1, "Definitely disagree", 2, "Strongly disagree", 3, "Disagree" to 7, "Definitely agree". A sample item for attitude is "All things considered, I

think using shared-bike would be enjoyable", for subjective norm is "People who are important to me would think I should use bike-sharing", and for perceived behavioral control is "If I want, I will be able to use bike-sharing". A measure of three item scale for intention was adapted from Shin, Im, Jung, & Severt [56]. A sample item is "I am planning to use bike-sharing when it will be available in the future". Finally, a five-item scale were adapted and modified from Kashif, Zarkada, Thurasamy, & Kashif [57] and Stephenson *et al.* [51] to measure religiosity. A sample item is "I am sure that God (or a higher power) is active in my life".

Table 1. Demographics of the respondents.

Criteria	Frequecy (Percent)
Gender	
Female	277 (100%)
Age	
<20	42 (15.2%)
20 - 29	193 (69.7%)
30 - 39	28 (10.1%)
40 - 49	14 (5.1%)
Education	
Primary School	17 (6.1%)
High School	15 (5.4%)
College (HSC/Equal)	81 (29.2%)
Bachelor (Pass)	28 (10.1%)
Bachelor (Honors)	74 (26.7%)
Masters	62 (22.4%)
Religion	
Muslim	238 (85.9%)
Hindu	35 (12.6%)
Buddah	4 (1.4%)
Household Income (in BDT)	
<10,000	83 (30%)
10,001 - 20,000	69 (24.9%)
20,001 - 30,000	56 (20.2%)
30,001 - 40,000	55 (19.9%)
40,001 - 50,000	14 (5.1%)

Table 2. Construct reliability and convergent validity.

Construct and scale items*	Factor Loadings**	T-Value	Mean	S.D	Skewness	Kurtosis
Attitude (ATT) (Ã & Hsu [35])						
All things considered, I think using shared-bike would be enjoyable	0.846	25.501	5.46	1.111	−0.574	0.496
All things considered, I think using shared-bike would be fun	0.758	28.552	5.39	1.060	−0.021	−0.772
All things considered, I think using shared-bike would be pleasant	0.856	45.052	5.77	.859	−0.978	1.474
All things considered, I think using shared-bike would be favorable	0.936	129.359	5.46	1.150	−0.662	0.604
Subjective Norm (SN) (Ã & Hsu [35])						
Most people I know would choose bike-sharing as a travel mode	0.89	63.586	4.78	1.823	−0.696	−0.450
People who are important to me would think I should use bike-sharing	0.934	118.972	4.74	1.478	−0.595	.099
People who are important to me would approve of my shared-bike using	0.916	78.111	4.74	1.717	−0.868	.020
Perceived Behavioral Control (PBC) (Ã & Hsu [35])						
If I want, I would easily use bike-sharing	0.943	138.844	4.64	1.738	−0.694	−0.312
If I want, I will be able to use bike-sharing	0.95	146.103	4.53	1.701	−0.631	−0.335
If I want, I will have control to use bike-sharing	0.885	41.622	4.65	1.714	−0.627	−0.165
Religiosity (RS) (Kashif, Zarkada, Thurasamy, & Kashif [57], Stephenson *et al.* [51])						
I regularly pray five times a day	0.911	58.754	4.36	1.815	−0.290	−0.824
I am sure that God (or a higher power) is active in my life	0.857	41.015	5.80	1.288	−0.423	−1.555
It is important for me to spend more time on religious activities	0.957	63.751	4.98	1.919	−0.890	−0.294
I live my life according to my religious beliefs	0.962	77.177	5.24	1.809	−0.876	−0.182
My religious leader(s) would favor bike-sharing for me	0.927	59.085	5.14	1.739	−0.508	−1.029
Behavioral Intention (BI) (Shin, Im, Jung, & Severt [56])						
I am planning to use bike-sharing when it will be available in the future	0.961	216.724	5.00	1.837	−0.892	−0.003
I intend to use bike-sharing as a travel mode in the future	0.905	31.689	4.84	1.935	−0.750	−0.399
I will expend effort on choosing bike-sharing in the future	0.936	80.982	5.07	1.714	−1.005	.326

*Seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). **Based on bootstrapping with 5000 samples.

Demographics: For this study, only female was used as sample. Besides, age, education, religion, household income were selected as demographics. Age was measured using a seven-point scale (1 = 18 - 20), (2 = 20 - 29), (3 = 30 - 39), (4 = 40 - 49), (5 = 50 - 59), (6 = 60 - 69) and (7 = >70). Education was measured using eight-point scale (1 = primary school, 2 = high school, 3 = higher secondary school, 4 = bachelor (pass course), 5 = bachelor (honors), 6 = masters, 7 = doctoral, and 8 = others). Religion and household income were measured using five-point and six-point scale respectively.

Others: Besides demographics and latent variables' questions, two other questions were added namely "Do you know how to ride bicycle?" and "Do you think

that the existing dress culture is suitable for bicycling?" These questions were measured using two-point scale "Yes" and "No".

We translated the questionnaire into Bengali so that respondents can understand the purposes of the questions clearly and answer. We sought help from two associate professors of social science of a famous public university in Bangladesh. No incentives were offered to the respondents to avoid biasness.

2.5.4. Analytical Method

The study used the partial least squares structural equation modeling (PLS-SEM) approach to analyze the model portrayed in **Figure 1**. SEM is "a multivariate technique based on variates in both the measurement and structural models" [58]. This was used for the reasons given herewith: PLS-SEM approach is suitable for such research context that has not been well studied yet and it is a prediction-oriented method [59] [60]. In this perspective, the software is greatly appropriate to assess large complex models and it is suitable under for the small sample size [61] [62]. This study used a two-step analysis: first one is measurement model, second one is structural model. The PLS-SEM was performed using the Smart PLS software version 3.2.8. This study also used SPSS 22 for descriptive statistical analysis. As depicted in **Table 2**, the skewness of 17 items out of 18 was between −1 and +1 and the kurtosis of 15 items out of 18 was between −1 and +1. This means that for the assumption of normality, there is no critical bias [63].

2.5.5. Analysis of Result

Existing literature recommends a two-step analysis method if data is analyzed by SmartPLS [64] [65]. At first, to test reliability and validity, measurement model is required to be examined. In second step, the structural model examination is necessary to test the research model and hypotheses.

2.5.6. Measurement Model

In the measurement model, reliability and validity tests were examined. This assessment includes specific quality measures, including indicator reliability, internal consistency reliability, convergent validity, and discriminant validity [63]. The results are presented in **Table 3**. Threshold level for composite reliability (CR), standardize factor loadings, Cronbach's alpha, and average variance extracted (AVE) is 0.7, 0.7, 0.7 and 0.5 respectively, according to the standard measures in the existing literature [66] [67]. As shown in **Table 3**, range of all factor loadings are consistently exceeded the threshold level of 0.7. So, good indicator reliability is found [68]. Also, the values of composite reliability [69] and Cronbach's alpha [70] are greater than 0.7 that confirming internal consistency reliability. It is same for the convergent validity too. The average variance extracted (AVE) is clearly above the suggested threshold of 0.5 and thus ensured the good convergent validity [69]. Finally, the result shows sufficient discriminant validity as Fornell and Larcker [67] suggests. According to them, a good discriminant validity is confirmed when the square root of AVE scores is higher

than the correlations among the constructs. Thus, as shown as bold diagonal elements, square root of all AVE scores are greater than any other correlation coefficients among all constructs. Moreover, all of the indicator's cross loadings are lower than all of its loadings. Additionally, the discriminant validity is confirmed by the heterotrait-monotrait (HTMT) ratio of correlations that has no threshold value over 0.90 as shown in Table 4. The threshold level for HTMT is unsettled [71]. Although 0.85 is said by some authors [72], 0.90 also has literature support [73] [74].

2.5.7. Structural Model

In relation to the two-stage approach in PLS-SEM, if there are sufficient results provided by the measurement model, the structural model's evaluation follows. This stage requires the repeated measures to the previous step's criteria. This assessment includes path coefficient with their significance and the R^2 values (the coefficient of determinants).

Table 3. Evaluation of the measurement model.

Latent construct	Range of factor loadings	Inter construct correlations*					Composite Reliability (CR > 0.7)	Cronbach's Alpha (α > 0.7)	Average variance extracted (AVE > 0.5)
		ATT	SN	PBC	CV	BI			
Attitude (ATT)	0.758 - 0.936	**0.851**					0.913	0.871	0.725
Subjective Norm (SN)	0.890 - 0.934	0.556	**0.913**				0.938	0.901	0.834
Perceived Behavioral Control (PBC)	0.885 - 0.950	0.793	0.592	**0.926**			0.948	0.917	0.858
Religiosity (RS)	0.857 - 0.962	−0.216	0.093	0.155	**0.924**		0.967	0.958	0.853
Behavioral Intention (BI)	0.905 - 0.961	0.808	0.598	0.838	−0.225	**0.934**	0.953	0.927	0.872

*While bold numbers on the diagonal show the square root of AVE for that construct, the off-diagonal elements show the latent variable correlations.

Table 4. HTMT ratio.

Constructs	ATT	SN	PBC	RS	BI	Moderating 1	Moderating 2	Moderating 3
ATT								
SN	0.619							
PBC	0.883	0.646						
RS	0.889	0.653	0.890					
BI	0.232	0.116	0.168	0.215				
Moderating 1	0.326	0.432	0.185	0.306	0.174			
Moderating 2	0.385	0.107	0.329	0.386	0.171	0.341		
Moderating 3	0.180	0.358	0.195	0.265	0.083	0.781	0.411	

We assessed the individual strength of the path coefficients and their statistical significance by using the bootstrapping re-samples procedure with 5000 samples to test the causal relationships among attitude, subjective norm, perceived behavioral control, and religiosity [61]. The significance of all postulated relationship between the constructs is shown in **Table 4**. The relationships of attitude, subjective norm, perceived behavioral control and religiosity with behavioral intention are highly significant at $p < 0.001$ levels and the moderating relationship between religiosity and subjective norm is significant at $p < 0.01$ level. The other two moderating relationships were found insignificant.

In more detail, the result we have found in our analysis suggests that female users' BI (behavioral intention) toward bike-sharing is significantly affected by the ATT (attitude) ($\beta = 0.226$, $p < 0.000$), SN (subjective norm) ($\beta = 0.106$, $p < 0.001$), PBC (perceived behavioral control) ($\beta = 0.597$, $p < 0.000$), and RS (religiosity) ($\beta = -0.77$, $p < 0.001$). This supports H01, H02, H03, and H04. Moreover, the relationship between SN and BI is moderated by the RS ($\beta = 0.065$, $p < 0.01$). So, Hb is supported. **Figure 2** and **Table 5** show the summary. However, hypothesis Ha and Hc are not supported. That means there is no moderating effect of RS on ATT and PBC. R^2, the coefficient of determination, is the most appropriate measure used for the structural model assessment. It represents the amount of explained variance of the endogenous latent variable (the model's predictive power) that is determined by all of the linked exogenous constructs [63]. Henseler *et al.* [64] consider R^2 value 0.67 for substantial, 0.33 for moderate, and 0.19 for weak explanatory power. Therefore, the explanatory power for the BI can be described as substantial which constitutes 0.822. Also, the model fit indices used in this study. The standardized root mean square residual (SRMR < 0.08) [75] is 0.062 which offers an appropriate model fit.

3. Discussion

The major goal of this study was to build a research model that clearly explain female users' complex psychological process of decision making to use publicly shared bike as a sustainable travel mode. Specifically, this research empirically evaluates the influence of religiosity on female users' adoption intentions. Moreover, this study seeks to examine the moderating effect of religiosity toward bike-sharing as a sustainable mode of transportation on attitude, subjective norm, and perceived behavioral control. Reliability and validity level of measurement instruments were found satisfactory according to existing literatures. Moreover, the proposed model fitness also identified good based on TPB. The hypothesized relationships among the study variables were supported by the SEM analysis. In general, our findings successfully studied and revealed the complex relationship among attitudes, subjective norm, perceived behavioral control, and religiosity toward behavioral intention of using mobile bike-sharing. Thus, our study contributes to the theory building in bike-sharing adoption, and informs government policy makers and business investors to consider the influence of religiosity on potential female consumers.

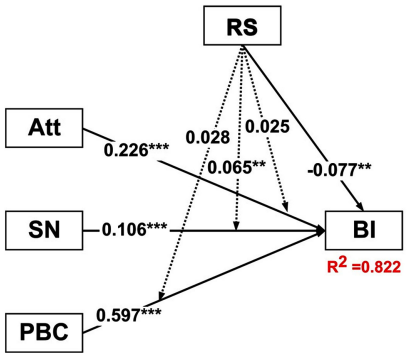

Figure 2. Hypothesized model with standard path coefficient $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

Table 5. Results of hypothesis testing and the model's predictive power.

Hypotheses	Path	β Path Coefficients	T-value	*P*-value	f^2	Result
H1	**ATT → BI**	0.226	4.400	0.000***	0.084	H1: Supported
H2	**SN → BI**	0.106	3.259	0.001***	0.028	H2: Supported
H3	**PBC → BI**	0.597	13.043	0.000***	0.587	H3: Supported
H4	**RS → BI**	−0.077	3.295	0.001***	0.028	H4: Supported
Ha	**ATT *RS → BI**	0.028	0.675	0.500	0.001	H5: Not supported
Hb	**SN *RS → BI**	0.065	2.359	0.018**	0.013	H6: Supported
Hc	**PBC *RS → BI**	0.025	0.817	0.414	0.001	H7: Not supported
Construct		**R^2 value**	**Effect level**			
BI		0.822	SUBSTENTIAL (0.818 ADJ)			

The TPB is open to add additional predictors of behavioral intention [19]. Also, it does not consider the effect of some important variables to clarify individual decision making thoroughly and does not include some necessary factors to predict behavioral intention [28]. Our proposed theoretical model introduces such an important factor that is an extension of the TPB. The extension is to improve theoretical accuracy and sufficiency to explain individual decision making more clearly in choosing bike-sharing as a travel mode in a developing and Muslim nation for female users. Our findings state that the original TPB constructs are not sufficient enough to explain shared bike users' intention, especially, in developing country like Bangladesh where religion is a great instrument practiced by majority. Therefore, our research model is an extension over the original TPB. Researchers and practitioners, who want to examine the behavioral intentions of choosing transport mode in regions like Bangladesh, can use this model to have a deep insight.

We assessed both TPB components and the external factor "religiosity" to identify their influence on bike-sharing intentions. Attitude showed a very positive influence on behavioral intention toward public bike-sharing. This result indicates that female users' in Bangladesh would rely on their thoughts and feel-

ings about bike-sharing during choosing transport modes. In other words, female users would be motivated to choose bike-sharing if they have positive attitude toward this travel mode and would avoid bike-sharing if they feel something uncomplimentary with it. This study also found a significant relationship between subjective norm and behavioral intention. But this relationship is not much stronger as the attitude-intention relationship. However, this result suggests that women in Bangladesh would more likely to choose shared bike if they had positive recommendations about it from their friends and family. Perceived behavioral control also found very significant in this study which means that female users think that bike-sharing would be easier to them to use.

Finally, we added religiosity to the TPB model which is found significantly and negatively related to female users' behavioral intentions. Therefore, the more the female users are religious, the less intention they would have toward bike-sharing. Also, religiosity has moderating effect on subjective norm which means that impact of friends and family on a female user's decision making regarding bike-sharing would be influenced by religiosity.

4. Conclusions

In general, Bangladesh is a typical Muslim country where religion is openly practiced in every sphere of life in social and even professional arenas and majority of the respondents are Muslims. It seems to us that three important factors would influence the majority of women to avoid public bicycling in Bangladesh. First, ethically, pious females in Bangladesh would not accept it due to the prevailing Islamic culture. Second, one is that most of them do not know how to ride bicycle. The third factor is that the existing dress culture is not much suitable for bicycling. Existing Islamic culture is one of the major reasons behind these issues of not learning bicycling and unsuitable dress.

At the end, we suggest the public authorities such as municipality and private investors to consider this phenomenon before launching this environment friendly travel mode in Bangladesh. Because, people are deeply influenced by social norms that may guide them to traditional instead of green mode of transportation [76]. Therefore, our findings suggest that the government of Bangladesh should create mass awareness concerning this vastly spreading transportation alternative which is environment friendly and being taken by developing countries, too. Besides, government may engage religious leaders to educate people the right religiosity because much superstitious and misleading religious legislation are still being practiced in Bangladesh. Alternatively, social media can be utilized to advertise the benefits of this travel mode for successful gaining because bike-sharing in Bangladesh is still in very limited areas.

5. Recommendations

No study is beyond limitations. In this study, at first, we conducted this study only in Comilla City Corporation, Bangladesh that does not represent the whole

country because there are eight more big cities in Bangladesh besides more than 50 small towns. Also, due to the scope of the study, only religious factors were added to the model. So, other cultural factors or conditional and functional values, and environmental factors were ignored that could also help explain users' intentions. Moreover, this study might have some biasness for two reasons. One, self-report data may be affected by a number of biases [77] specially if they refer to attitudes for a upcoming scheme [7]. Two, in terms of prediction, human overestimate the positivity and underestimate the negativity of something that will happen in future [78]. Bracha and Brown [79] also told the same thing that people are biased toward advantageous outcomes.

For further study, we recommend another study including other cultural dimensions such as collectivism, in a bigger area of Bangladesh. Also, other Muslim nations having similar social and cultural practices can be taken into consideration to identify whether there are same issues. Middle East countries along with Pakistan can be taken into consideration for this purpose.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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