

International Journal of Social Science Research (IJSSR)
 eISSN: 2710-6276 | Vol. 3 No. 1 [March 2021]
 Journal website: <http://myjms.mohe.gov.my/index.php/ijssr>

WHO EXHIBITS ENVIRONMENTAL AWARENESS MORE? A MULTI-GROUP ANALYSIS OF GENDER DIFFERENCES

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Article Information:

Article history:

Received date : 25 February 2021
 Revised date : 28 March 2021
 Accepted date : 29 March 2021
 Published date : 31 March 2021

To cite this document:

Azila, J., Wan Farha, W., Jannah Munirah, M., & Mohammad, I. (2021). WHO EXHIBITS ENVIRONMENTAL AWARENESS MORE? A MULTI-GROUP ANALYSIS OF GENDER DIFFERENCES. *International Journal of Social Science Research*, 3(1), 146-160.

Abstract: *The study aims to investigate the environmental awareness from the perspective of gender differences. Specifically, the study examines direct relationships between knowledge and social media usage toward environmental awareness. Also, the study assesses the moderating role of gender on 'knowledge-environmental awareness' and 'social media usage-environmental awareness' relationships. The convenience sampling technique was utilized with 118 responses were collected. By using PLS-SEM, results revealed that knowledge and social media usage positively influence environmental awareness. Nevertheless, gender presented no significant influence on the existing relationships. Thus, future research is suggested to expand this issue in different perspective.*

Keywords: Gender, social media, knowledge, environmental awareness.

1. Introduction

In today's atmosphere, environmental issues have received significant research attention from diverse perspectives. Consumer behavior is among the most research topics because the irresponsible treatment of the environment gives tremendous impact to the environment (Chua et al., 2019). Therefore, there is an urgent call to create balance ecosystem with the support of environmental movement in human lives. Environmental awareness is a driver to move into environmental action. It helps people to get better understanding on the instability of the environment and the importance to preserve it for our better future. There are two categories of environmental awareness, which are behavioral inclination to conserve the environment and perception toward environmental problems. Although most of people understand the importance of protecting the environment, however, this knowledge and understanding is not keen enough to transform their behavior into environmental action. Past study proved that knowledge did not transform individual conservative behavior toward environmental behavior

(Liu, et al., 2020). Most of people are aware on the environmental issues however, their behavior is threatening the environment (Joshi & Rahman, 2016). Therefore, to alleviate this matter efficiently, there is a need to change the conventional behavior to trigger the environmental awareness among individuals (Liobikiene et al., 2016).

Apart from that, knowledge of environmental issues becomes a distinctive threat to the environment and not sufficient to protect the environment. Therefore, the arrangement of environmental issues must begin with the modification of human behaviors, more specifically on their awareness (Rana & Paul, 2017). Prior research has consistently proved that women exhibit higher awareness than men with regards to environmental issues (Chekima, et al., 2016; Oztek & Cengel, 2013). Additionally, empirical findings have examined that women exhibit higher concern on environmental risks (Altaher, 2013). On the other hand, Wolters (2014) discovered no significant differences between genders with regards of environmental awareness. Due to past inconclusive research findings, the study aims to measure the impact of knowledge and social media usage toward environmental awareness with gender as a moderator.

2. Literature Review

2.1 Behavioral Change Model

With a growing focus on environmental sustainability, prior researchers have discussed the behavioral change in human lives (Onel & Mukherjee, 2015; Sawitri et al., 2015). The fundamental changes in individual behavior are the major contribution toward achieving environmental sustainability to mitigate the risks in environmental deterioration (Kaaronen & Strelkovskii, 2020). Prior research indicates that intention is the most important psychological factor in directing individual's behavioral change (Bamberg & Moser, 2007). People with pro-environmental intention display high tendency to engage in environmental action (Kim & Chung, 2011). However, past findings have found that positive intention did not transform the behavior of consumers into pro-environmental behavior (Sharma et al., 2019; Szmigin et al., 2009). Therefore, the intention-behavior gap should be further investigated and requires more rigorous research attention to address this gap.

Generally, behavioral change model identified environmental behaviors were developed from a knowledgeable community that aware of environmental issues (Hungerford & Volk, 2013; Onel and Mukherjee, 2016). This is because environmental knowledge can motivate the attitude and awareness of individuals to conduct pro-environmental behaviors. Based on this model, the formation of behavioral change is based on the interrelationship between knowledge, awareness or attitude and environmental action. Furthermore, prior research has found that knowledgeable people are able to react on environmental issue and transform their intention toward behavioral action (Onel and Mukherjee, 2016). Besides, with a changing behavior towards environmental conservation has increased the awareness of people to conduct environmental action in their lives. Thus, by adapting to this model, this study considers knowledge as a determinant factor of environmental awareness among Malaysian consumers.

2.2 Relationship between Knowledge and Environmental Awareness

Knowledge can be described as insightful information kept in individuals' memory that gives impact to their practice prior to a particular choice in decision-making (Gamble and Blackwell, 2001). Past studies indicate that knowledge is an important basis of creating environmental awareness among consumers that increase their willingness to purchase for green products (Onel and Mukherjee, 2016). In the context of purchase behavior, knowledge is proven to be one of the motivational factors for consumers to change their conventional purchase behavior into green purchase behavior (Huang et al., 2014; Joshi and Rahman, 2017). Additionally, knowledge was found significantly influence consumers' perception to purchase, use and recycle green products among Chinese (Zhao et al., 2014). Moreover, it is believed that an increase in consumers' knowledge of environmental issues can increase their awareness to purchase and consume green products (Tan, 2011).

Although the influential factor of knowledge towards environmental behaviors has been studied from diverse research contexts, however, limited studies have measured this relationship in non-Western countries such as in Malaysia. Therefore, this study assumes that having a good knowledge on environmental sustainability will influence individual awareness consumers to demonstrate green behavior. Based on this assumption, the following hypothesis is developed:

H1: Knowledge has a positive effect on environmental awareness among consumers.

2.3 Relationship between Social Media Usage and Environmental Awareness

The rapid changes in technology give tremendous popularity in social media platform as the main medium in consumers' buying process. In 2018, it was reported that Malaysia online users had reached to 25.08 million where social media platform become a preferred medium in buying process as compared to the brick and mortar services (Malaysia e-commerce, 2018). Thus, it showed that the usage of social media becomes increasingly crucial in diverting consumer preferences into green products (Wang, 2017; Jaini et al., 2020).

The researches on social media have been widely discussed in different marketing contexts. The usage of social media was examined in the areas such as purchase intention (Vahdati & Nejad, 2016), purchase and post-purchase behavior (Wang & Yu, 2017), attitude (Zainal et al., 2017), brand image (Jalilvand & Samiei, 2012) and impulse buying behavior (Husnain et al., 2016). However, a lack of research that examines the relationship of social media usage and environmental awareness among Malaysian consumers. Thus, the analysis of social media usage in measuring consumers' environmental awareness is going to shed light on the green marketing and consumer behavior literature to expand the scope of this research in another perspective. Therefore, following the previous justification, the following relationship is hypothesized:

H2: Social media usage has a positive effect on environmental awareness among consumers.

2.4 Moderating Role of Gender

In the past literature have stated numerous variables pertaining to consumers' environmental behavior in various research contexts (Huang et al., 2014; Joshi & Rahman, 2017; Onel & Mukherjee, 2016). However, attitude-behavior discrepancy was discovered in many studies where positive attitude did not lead to environmental behavior all the times (Aggrawal & Nargundkar, 2016; Moser, 2015). Perhaps, an explanation on this inconsistency might be due to different demographic background such as gender differences among consumers that lead to multiple environmental responses that wider the attitude-behavior gap in a specific research context (Wong et al., 2014). Considering this matter, there is a need to consider gender as a possible moderator to strengthen the stated relationships before.

Prior researches have discussed the differences of environmental behavior among male and female consumers (Mostafa, 2007; Han et al., 2019). Different gender background is one of the factors that give multiple reactions toward environment based on the knowledge he or she had. Furthermore, Tikka et al. (2000) also found that gender is a major determinant of environmental knowledge and behavior among Western people and indicate that men hold higher environmental knowledge than women. However, different results gathered in non-Western country, which is in Hong Kong where female consumers exhibit positive attitude, concern and responsibility towards environmental problems as compared to male consumers (Lee, 2009). Based on the previous findings and discussions, it is possible to assume that gender is able to moderates all direct relationships in this study. In past studies, gender is significantly affecting the relationships in environmental studies such as in the context of green purchase behavior (Lee, 2009; Mostafa, 2007), the choice of environmentally responsible electric airplanes (Han et al., 2019) and energy efficient behaviors (Russell-Bennett et al., 2017). Pertaining to social media, the other study by Ismail et al. (2019) discovered that gender affect consumer behavior towards mobile marketing services. However, minimum attention has been paid with regards to environmental awareness among Malaysian consumers. Thus, considering this gap, the following hypothesis is developed:

H3: Gender moderates the relationship between knowledge and environmental awareness among consumers.

H4: Gender moderates the relationship between social media usage and environmental awareness among consumers.

2.5 Conceptual Framework

Based on previous justification on past literature, the proposed conceptual framework is shown in Figure 1.

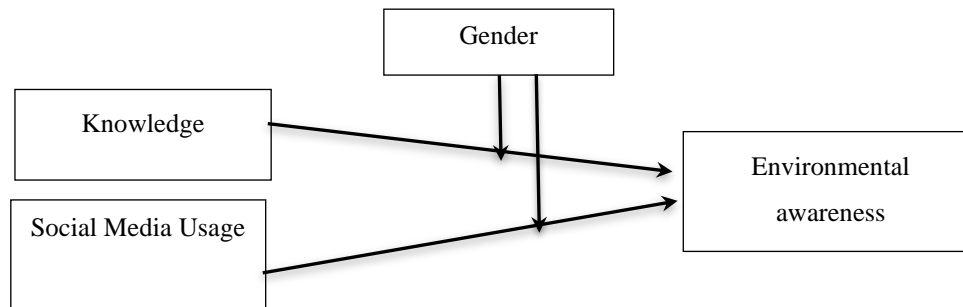


Figure 1: Conceptual framework

3. Method

3.1 Measurement

This study opts for quantitative research design with the use of questionnaire to collect data from respondents. The items are adapted from previous literatures where environmental awareness items are adapted from Sasikala and Parameswaran (2018), knowledge items are adapted from Mohiuddin et al. (2018) and social media usage items are adapted from Siddique and Hossain (2018). This study applied 5-point Likert scale for all items, where 1 indicated “strongly disagree” and 5 indicated “strongly agree”. The questionnaires were distributed to 15 regions across Malaysia, which is from Johor, Malacca, Sarawak, Labuan, Negeri Sembilan, Perak, Kedah, Selangor, Kuala Lumpur, Penang, Perlis, Pahang, Kelantan, Terengganu and Sabah.

3.2 Research Design and Sample Size

Since it is impossible to get a list of all population, this study opt for non-probability sampling method where convenience sampling technique was used in data collection. The questionnaire is designed with an appropriate introduction and followed by three main sections. Section A indicated demography background of respondents meanwhile Section B contains questions regarding dependent variable (environmental awareness). The lase section, which is Section C consists of questions pertaining to independent variables (knowledge and social media usage). The questionnaire was pre-tested and piloted before it was distributed to the respondents to ensure the validity and reliability of the items. The items were validated by reviewing the literature related to the constructs measured in other studies (Cavana et al., 2001). Then, the items were checked and evaluated by the experts from academician in well-known public university. All responses were considered, and the items were corrected accordingly. Then, the questionnaires were piloted to 50 respondents to check for internal consistency reliability. The Cronbach’s Alpha (α) values above 0.7 were considered accepted for all constructs and showed that the constructs were good and acceptable to estimate and measure the reliability of the questionnaire (Nunnally and Bernstein, 1994).

To indicate the minimum sample size, this study followed two rules of thumb based on statistical power analysis (Cohen, 1992) and G*Power software (Faul et al., 2007). According to statistical power analysis table, this study required a minimum number of 59 observations to achieve the statistical power of 80 per cent for detecting R² values of at least 0.25 with a 5 per cent probability of error. Then, based on G*Power software, three indicators are pointed to one variable suggested that minimum number of 77 cases were required to achieve the desired power of 0.80. This study gathered 118 usable responses and this number were accepted to conduct data analysis procedures.

4. Data Analysis and Results

Structural Equation Modelling (SEM) using the SmartPLS software was used to conduct statistical analysis procedures. This software was chosen to analyze the research hypotheses and run multi-group analysis for moderating relationships that involve with categorical variable (gender). Furthermore, PLS-SEM is applicable to run the analysis for all relationships between constructs in the measurement and structural model at the same time (Henseler et al., 2009). Despite that, PLS-SEM software is a nonparametric technique that able to run multi-group analysis in a research model (Hair et al., 2017).

4.1 Respondents’ Profile

Demographic profile discussed the details of respondents in terms of gender, age, races, educational level and monthly income level. Total respondents are 118 with 46 males and 72 females. The frequencies for all demographic profile are shown in Table 1.

Table 1: Demographic Profile

Demographics	Full Sample (N=118)	Male (N=46)	Female (N=72)
Age			
i. 20-29	72	24	48
ii. 30-39	23	12	11
iii. 40-49	12	5	7
iv. 50-59	9	4	5
v. 60 and above	2	1	1
Race			
i. Malay	53	26	27
ii. Chinese	48	12	36
iii. Indian	15	8	7
iv. Others	2	0	2
Education			
i. PMR/SPM	21	12	9
ii. STPM	6	2	4
iii. Certificate/Diploma	14	9	5
iv. Bachelor’s Degree	70	20	50
v. Master’s degree	2	1	1
vi. Others	5	2	3
Monthly income			
i. Less than RM1999	73	21	29
ii. RM2000-RM3999	32	18	32
iii. RM4000-RM5999	9	5	7
iv. RM6000 and above	4	2	4

4.2 Common Method Variance Assessment

Since all constructs were answered by a single source, which is Malaysian consumers, therefore the issue of common method variance (CMV) may arise. This study conducts procedural and statistical approaches to measure the data free from CMV issue. First, the items were reviewed for content and face validity and then tested for Harman's single factor test (Podsakoff et al., 2003) for statistical approach. The results revealed that the output of EFA shows that the first factor explained 33.01 per cent of the total variance and showed that the data was accepted with no CMV issue.

4.3 Assessment for Measurement Model

The measurement model analyzed the validity and reliability of the data. All constructs in this study were measured reflectively. Therefore, the assessment of the measurement model is broken into convergent validity (indicator reliability/outer loading and average variance extracted) and discriminant validity. Convergent validity was assessed through factor loading (FL), composite reliability (CR), and average variance extracted (AVE) (Henseler et al., 2015). Based on the rules of thumb, values of loadings should be higher than 0.60 (Chin, 1998) and CR values should be greater than 0.70 (Henseler (2016). Meanwhile, AVE values should be more than 0.50 (Hair et al., 2017). As refer to rules of thumb, Table 2 presented loading values for all items are exceeded the threshold value of 0.6 except for K2, K3 and SM2. Since all these three items have low loadings, therefore, its have been deleted from measurement model. The measurement model is been tested again and the results for all constructs meet the threshold values for all criteria. Therefore, it showed that the data achieved the reliability of the measurement model at the item and construct levels. Furthermore, to achieve adequate convergent validity, AVE value of greater than 0.50 indicates the construct shared substantial variance with its respective items (Henseler et al., 2016; Hair et al., 2017). As depicted in Table 2, all constructs have AVE values greater than 0.50 and thus confirm the convergent validity of all constructs.

Table 2: Assessment of measurement model

Construct	Items	Full data set (N=118)			Female (N=72)			Male (N=46)		
		Loadings	CR	AVE	Loadings	CR	AVE	Loadings	CR	AVE
EA	EA1	0.785	0.822	0.607	0.726	0.813	0.593	0.849	0.836	0.630
	EA2	0.809			0.855			0.767		
	EA3	0.742			0.724			0.762		
K	K1	0.728	0.819	0.533	0.710	0.806	0.512	0.767	0.838	0.569
	K4	0.840			0.827			0.862		
	K5	0.627			0.653			0.576		
	K6	0.709			0.657			0.784		
SM	SM1	0.767	0.846	0.582	0.709	0.801	0.505	0.818	0.893	0.676
	SM3	0.673			0.584			0.747		
	SM4	0.868			0.804			0.919		
	SM5	0.728			0.729			0.796		

Note. Items K2, K3 and SM2 were removed from dataset due to low loading (<0.60)

Then, the analysis continues with assessing the discriminant validity for the constructs in the measurement model. Discriminant validity is concerned about the extent of a construct to be different from other constructs by empirical standards (Hair et al., 2014). One way in accessing discriminant validity is through heterotrait-monotrait ratio (HTMT) of the correlations (Kline, 2011). The assessment of HTMT proceeds with examining the HTMT ratios through computing bootstrap confidence intervals. Table 3 presents the results of HTMT criterion. From the results, it shows that the HTMT values of all constructs fulfil the criterion of HTMT_{.90} (Gold et al., 2001). This showed that all constructs analyzed in this study has no discriminant validity issue.

Table 3: Discriminant validity (HTMT.90 Criteria)

Construct	Full data set (N=118)			Male (N=46)			Female (N=72)		
	EA	K	SM	EA	K	SM	EA	K	SM
EA									
K	0.631			0.688			0.631		
SM	0.758	0.743		0.726	0.885		0.758	0.743	

4.4 Structural Model

The assessment of structural model is done through bootstrapping procedure with 5000 re-samples. Based on Table 4, the results of full and split dataset show that knowledge exert significant effect on environmental awareness (female and male). Similarly, social media usage also yields a significant effect on environmental awareness for full and female dataset, but insignificant results for male dataset. Therefore, based on these results, H1 and H2 are supported.

The assessment of structural model continued with calculating explanatory power of the model (R^2 values). Based on the rules of thumb, Cohen (1988), R^2 values of 0.26, 0.13 and 0.02 exhibit substantial, moderate and weak explanatory power (Cohen, 1988). As depicted in Table 4, environmental awareness has R^2 values 0.338 for full model, 0.350 for female model and 0.408 for male model. Thus, the explanatory power for all models is substantial.

Finally, the blindfolding procedure was conducted to measure the accuracy of the model. This procedure can be done for reflective endogenous constructs (Hair et al., 2014). Data has adequate predictive relevant if Q^2 values are greater than zero (Hair et al., 2017). As shown in Table 4, the values for Q^2 are more than zero, demonstrating the proposed model has adequate predictive relevance.

4.5 Measurement Invariance

Before analyze the comparison of path coefficients between genders, this study should test the measurement invariance (Henseler et al., 2016). According to Henseler (2016), the measurement invariance of composites (MICOM) method is required to test these two groups (female and male) have similar understanding of the measurements (Table 5). The first step in MICOM procedures is to configure invariance assessment (measurement models have the same basic factor structure for both groups). Then, the second step involve with compositional invariance assessment, which is composite scores are not significantly different across groups and the third step is the equality of composite means values and variances. The partial measurement invariance can be achieved if configurable and compositional variances are established. However, full measurement invariance can be achieved when partial measurement invariance is established with the composite has equal mean values and variance across all groups. Therefore, based on Table 5, this study established partial and full measurement invariance of the two groups, which is a sufficient to compare and interpret the MGA's group-specific differences of PLS-SEM results (Henseler et al. 2016).

4.6 Multi-Group Analysis

As gender is categorical variable, the conceptual model was tested using multi-group analysis (MGA). The permutation approach in PLS-SEM software is utilized due to this technique does not required to meet the distributional assumption (Hair et al., 2017). Prior to the employment of MGA, the data set was split into male and female. To run permutation analysis, bootstrap sampling technique was utilized to generate the confidence intervals and p-value. A p value of differences between path coefficients lower than 0.05 or higher than 0.95 indicates at the 5% level significant differences between specific path coefficients across two groups (Sarstedt et al., 2011). As depicted in Table 6, the results of this study do not support a significant difference between female and male for both relationships between knowledge and environmental awareness (H3) and social media usage and environmental awareness (H4). Therefore, H3 and H4 are not supported in this study.

5. Discussions and Conclusion

The purpose of the study is to measure relationships between knowledge and social media usage toward environmental awareness among Malaysian consumers from 15 different regions. Furthermore, this study intends to shed some light on the gender influence on environmental awareness among Malaysian consumers. Specifically, this study assesses the responses from different group of gender in the relationship between knowledge and environmental awareness and between social media usage and environmental awareness. This study adapted Behavioral Change Model to develop the hypotheses and conceptual framework in this study. PLS-SEM software was used to run the analysis for all relationships and MGA method is applied to test the categorical variable of gender in assessing the moderating relationships.

Based on the results, knowledge and environmental awareness has significant relationship and thus confirmed the validity of behavioral change model in accessing the environmental awareness among consumers. Furthermore, the findings also align with previous empirical findings that found the importance of knowledge is a basis of creating environmental awareness among consumers (Onel and Mukherjee, 2016). Similarly, the findings also found support for H2, which is the relationship between social media usage and environmental awareness. Therefore, it showed that the usage of social media is crucial in motivating and persuading the consumers to become aware on environmental issues. The usage of social media is reliable in influencing consumers' awareness and its flexibility concept able to reach a wider scope of consumers to stimulate their pro-environmental behavior. Thus, the results contribute to the existing literature on the empirical extent of social media usage affecting environmental awareness among Malaysian consumers.

Furthermore, this study also compares the difference group of gender (female and male) pertaining to the relationships between knowledge and social media usage towards consumers' environmental awareness. The multi-group analysis results revealed insignificant results for female and male in terms of their knowledge and social media usage on their environmental awareness. The reason lies in these insignificant relationships might be due to gender stereotyping in Malaysia is highly represented in presenting their environmental awareness. The results are in line with past study where no significant difference between genders in presenting their attitudes toward green products (Chen & Chai, 2010). Furthermore, the insignificant results also revealed by other environmental studies (Eagles & Muffit, 1990; D'Souza et al., 2007).

In conclusion, the present study sheds some light in investigating environmental awareness among Malaysian consumers. Data is gathered from 15 regions in Malaysia and SmartPLS version 3.7 was used to analyze the data. The findings of the study showed significant results for all direct relationships, specifically between knowledge and environmental awareness and also between social media usage and environmental awareness. Additionally, the findings of the study did not found support for moderating relationship of gender on the relationships between knowledge and environmental awareness and also between social media usage and environmental awareness. Therefore, future studies are needed to gain more insight in the literature to alleviate this matter.

6. Limitations and Future Research Directions

The present study highlighted some limitations. The limitations discovered in this research can be a direction for future research. For example, the results of the study were quantitatively gathered from consumers' responds. The additional interview results qualitatively gathered from the managers' respond could give further insights on this issue. Thus, future studies can consider mixed method derived from consumers and managers perspectives to acquire a better understanding of this context.

Additionally, this study only considers gender as a moderator in the conceptual framework. Therefore, it is recommended that another variable can be incorporated as a moderator. For example, further studies can examine Malaysian environmental awareness from different group of age, races and income level. Different group of consumers such as Millennial may exert different responses from other generations. Therefore, it will assist marketers and managers to investigate environmental awareness from another point of view and constructs better marketing strategies. Therefore, future investigation of other possible demographic factors can be considered to expand the research findings and gain new insight into future research.

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Table 4: Assessment of the structural model

	Path	Full data set (N=118)					Female (N=72)					Male (N=46)				
		Std Beta	Std Error	t-value	R ²	Q ²	Std Beta	Std Error	t-value	R ²	Q ²	Std Beta	Std Error	t-value	R ²	Q ²
H1	K -> EA	0.234	0.093	2.515*	0.338	0.179	0.216	0.111	1.945*	0.350	0.167	0.239	0.150	1.591	0.408	0.220
H2	SM -> EA	0.409	0.085	4.830*			0.441	0.093	4.757*			0.463	0.140	3.316*		

Note: *p<0.05

Table 5: Measurement invariance result using Permutation test

Compositional Invariance Correlation = 1				Equal Mean Assessment				Equal Variance Assessment			
Construct	Configure invariance	C=1	95% CI	Partial measurement invariance established	Difference of mean value	95% CI	Equal mean	Difference of the variances value	95% CI	Equal variance	Full measurement invariance established
EA	Yes	0.984	0.969-1.000	Yes	-0.074	-0.365- 0.338	Yes	0.144	-0.465- 0.512	Yes	Yes
K	Yes	0.989	0.938-1.000	Yes	-0.155	-0.352- 0.334	Yes	-0.109	-0.499- 0.598	Yes	Yes
SM	Yes	0.979	0.969-1.000	Yes	-0.348	-0.361- 0.379	Yes	-0.275	-0.574- 0.594	Yes	Yes

Table 6: Assessment of group difference

Hypotheses	Relationship	Std Beta values		Std Error values		t-values		Path coefficient differences	p-values		Decision
		Female	Male	Female	Male	Female	Male		Henseler MGA	Permutation	
H3	K -> EA	0.216	0.239	0.111	0.150	1.945*	1.591	-0.023	0.545*	0.616*	No/no
H4	SM -> EA	0.441	0.463	0.093	0.140	4.757*	3.316*	-0.022	0.558*	0.136*	No/no

Note: *p<0.05