A proposed model of online consumer behavior: Assessing the role of gender

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Abstract:

This research examined the influence of Internet experience and web atmospherics on consumer online behavior. It developed a model of web navigation behavior where these antecedent variables drove website exploratory behavior and website involvement, which in turn, drove site attitudes and pre-purchase evaluations. These relationships were tested and confirmed in the context of a pharmaceutical website. Further, men and women differed in web navigation behavior, with men engaging in less exploratory behavior and developing less website involvement than women. However, across the two sexes, entertainment, challenge, and effectiveness of information content were the key drivers of website attitudes. The findings provide several guidelines for online communication strategy.

Keywords: web experience | web atmospherics | website exploratory behavior | website involvement | modeling | gender

Article:

1. Introduction

The Internet is becoming an important facet of communication strategy due to its ability to deliver information, entertainment, and e-shopping. Internet access and usage have been steadily increasing in the United States with a corresponding increase in online information gathering and shopping. While men were considered early adopters of Internet shopping (Asch, 2001), recent data suggested that both men and women equally embraced this medium — 82% of men and 75% of women undertook online search for goods/services in 2005 (Pew Internet and American Life Project Survey, 2005).

Despite the growing importance of the Internet and its adoption by both sexes, research examining the factors that influence online browsing and consumer response toward online information is sparse. Also, little research investigated gender differences in online browsing. Specifically, although extant research studied gender differences in web advertising perceptions (Schlosser et al., 1999), use patterns (Weiser, 2000), and online privacy concerns (Sheehan, 1999), it did not directly examine how Internet experience and web atmospherics influenced the web navigation behavior of men and women. Hence, this research investigated the impact of

Internet experience and web atmospherics on online browsing and if the influence of these factors varied by gender.

2. Conceptual background

The Internet is emerging as the main source of information for many products due to its ease of use, wide access, and wealth of information. The literature suggests that external information search could be goal-directed pre-purchase search and interest-driven search (Bloch et al., 1986). While research focused on pre-purchase search aimed at reducing uncertainty and risk, some researchers investigated ongoing search based on hedonic recreation (Holbrook and Hirschman, 1982) and enduring involvement with a good or service (Bloch et al., 1986). Within the Internet medium, external information search was broken down into web navigating behaviors: searching, browsing, finding, selecting, comparing and evaluating information as well as interacting and transacting with the website. To account for these, the proposed model of web navigation behavior included four major variables (Internet experience, web atmospherics, online behavior, and outcomes) and their interrelationships: Internet experience is conceptualized as the consumer′s skills and challenge in using the Internet. Web atmospherics are related to the functional and hedonic characteristics of a website (i.e., structure, effectiveness, informativeness, and entertainment). Online behavior encompasses exploratory behavior and website involvement. Outcomes include site attitudes and pre-purchase evaluations. The conceptual model is depicted in Fig. 1 and explained below.

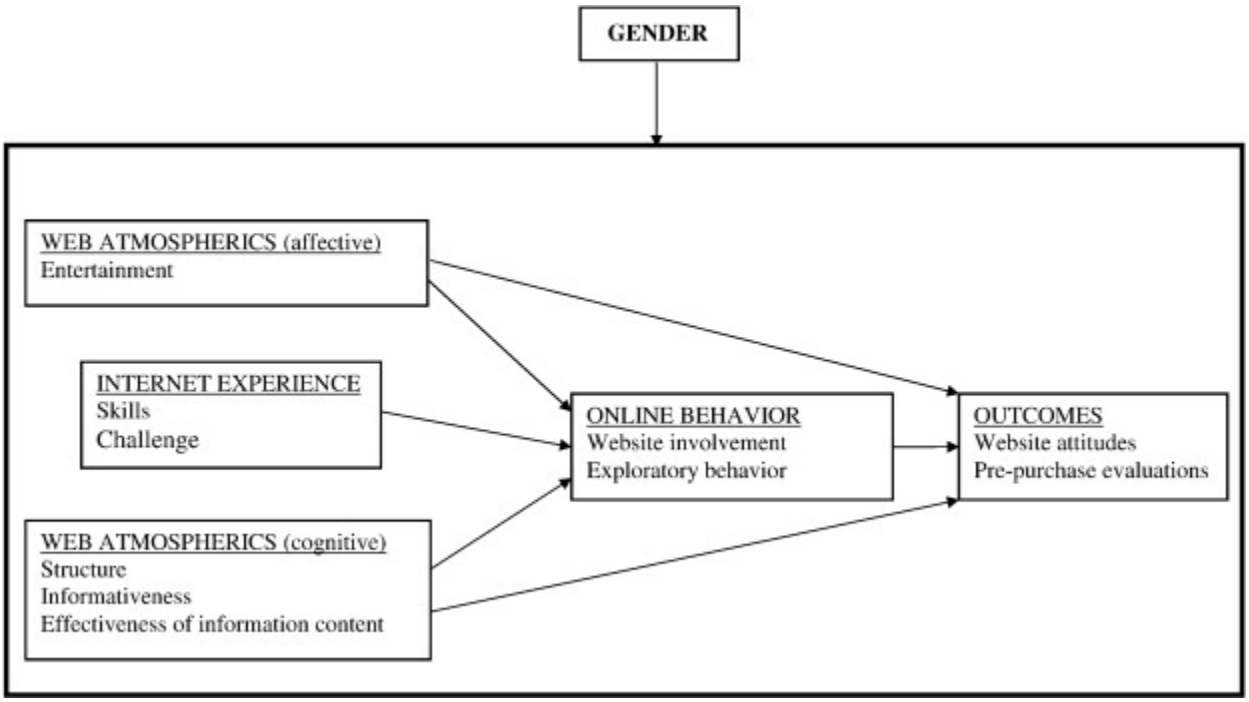

Fig. 1. Conceptual model of online consumer behavior.

2.1. Internet experience

Flow theory (Csikszentmihalyi, 1990) provided insights for the online information search experience (Internet experience). Flow is an intrinsically motivated optimal state which occurs

when challenge and skills are in balance and elevated beyond the critical threshold. When challenge encountered during task performance was matched to consumers' ability, they felt more active, alert, satisfied, pleased, and creative, whereas when such an optimal combination was absent the experience deteriorated (Csikszentmihalyi and LeFevre, 1989). In the online context, researchers reported findings consistent with this view. For example, researchers found that both challenge and skills were essential for creating positive online search experience (Mathwick and Rigdon, 2004, Novak et al., 2000). Ghani and Deshpande (1994) reported that the level of perceived skills and challenge in human–computer interactions was associated with achieving the flow state, which in turn predicted behavior. Luna et al. (2002) found that a website that offered optimal challenge (relative to skills) resulted in a more positive attitude toward the website. Also, skills and confidence in navigating websites were found to be antecedents of positive attitudes toward internet shopping (Childers et al., 2001). Thus, people skilled at using the web and finding it challenging experienced flow, searched for information online and responded favorably to such information. Thus:

> **H1.** There is a positive relationship between (a) skills and exploratory behavior; (b) challenge and exploratory behavior; (c) challenge and attitude toward the website; (d) challenge and pre-purchase evaluations.

2.2. Web atmospherics

Web atmospherics relate to the conscious development of website environment to induce a positive response. These are critical to the effectiveness of a site since they determine online browsing and purchase behavior. The literature identified four variables as web atmospherics: structure, effectiveness of its content, informativeness, and entertainment (Bell and Tang, 1998, Chen and Wells, 1999, Richard, 2005).

2.2.1. Structure

Store layouts and signage which improve consumer′s *wayfinding* are important to the success of brick-and-mortar retailers. This is even more relevant within the Internet medium where it is easy and relatively costless to leave a site and move to a competitive site. In online contexts, layout corresponds to website structure. Huizingh (2000) listed four navigational structures: a tree, a tree with a return-to-home page button, a tree with horizontal links, and an extensive network. Most websites (over 60%) had a simple structure of either a tree or a tree with a back to home page button, which allowed consumers to surf and access information easily (Poruban, 2002). Easy access to information can facilitate consumer goal achievement. The easier it was to learn and use navigational cues, the more cognitive capacity was available to process information in websites, resulting in better memory and superior attitudes. Consistent with this view, efficient websites induced positive attitudes toward websites (Elliott and Speck, 2005, Griffith, 2005). Thus:

> **H2.** Effective website structure leads to positive website attitudes.

2.2.2. Effectiveness of information content

It refers to currency of the information content of a website, and is akin to executional cognitive elements in MacKenzie and Lutz's (1989) framework. For Johnson and Misic (1999), both currency and presentation were critical, and consumers evaluated websites on both dimensions. Currency is critical in online contexts since the Internet is more interactive and the preferred source of information for consumers. Hence, consumers likely have higher levels of exploratory behavior and site involvement if the website has current information related to the topic. Thus:

> **H3.** There is a positive relationship between effectiveness of information content and (a) exploratory behavior; (b) website involvement.

2.2.3. Informativeness

It reflects the amount and richness of the information contained in the website, includes information about firms, products, non-commercial information, and transaction details such as payment options and shipping. With advances in technology, better search engines browsers, and faster downloading, websites are becoming more advanced, and have the capacity to encompass a lot of information along these dimensions (Huizingh, 2000). As informativeness increased, we assumed that consumers needed to engage in less exploratory behavior to obtain the same amount of information. Thus:

> **H4.** There is a negative relationship between informativeness and exploratory behavior.

2.2.4. Entertainment

The literature provided evidence that consumers obtained enjoyment from the shopping process itself. Holbrook and Hirschman (1982) identified a segment who found shopping to be hedonic, fun, and enjoyable. Babin et al. (1994) described this behavior as fun, fantasy, arousal, sensory stimulation, and enjoyment seeking. They suggested that these consumers appreciated the shopping experience for its own sake and valued entertainment during the process. In the online context, scholars noted that both ‘informativeness’ and ‘entertainment’ were important for evaluating a website (Ducoffe, 1996, Richard, 2005). Such entertainment was in the form of sensory and hedonic elements such as color, music, action, pictures, graphs, videos, and interactivity. McMillan et al. (2003) found that consumers with the greater perceptions of the site's entertainment value had more positive attitudes toward websites. Others reported that consumers surfed online for both information and pure enjoyment (Katerattanakul, 2002). Thus:

> **H5.** Entertainment positively relates to (a) exploratory behavior; (b) website involvement; (c) site attitudes.

2.3. Online behavior

It included exploratory behavior and website involvement. In turn, these drove variables such as website attitudes and pre-purchase evaluations. Pharmaceutical websites (the focus of this study) only provided information and were not allowed to sell to consumers. With this information, consumers chose to buy the product at their preferred pharmacy. Hence, pre-purchase evaluations and website attitudes were appropriate outcome measures.

2.3.1. Exploratory behavior

Characterized by information search or exploration through browsing, exploratory behavior positively influenced website attitudes. The Elaboration Likelihood Model (ELM) posited that attitudes formed via a thorough consideration of available information were stronger and more enduring (Petty et al., 1983, MacKenzie and Lutz, 1989). Hence, consumers who spent more time at a site, gathered and processed more information through exploratory behavior likely had more positive website attitudes. Thus:

> **H6.** There is a positive relationship between exploratory behavior and websites attitudes.

2.3.2. Website involvement

ELM suggests that high involvement subjects follow the central route to persuasion, forming attitudes on argument strength; whereas low involvement ones follow the peripheral route, forming attitudes on executional elements (Petty et al., 1983). In online contexts, limited available evidence was consistent with ELM predictions. For example, high involvement increased attention to relevant websites, information processing, and thought generation (Hoffman and Novak, 1996). For Balabanis and Reynolds (2001) positive attitudes developed when information and arguments on a site were relevant and strong. Thus:

> **H7.** There is a positive relationship between website involvement and (a) website attitudes; (b) pre-purchase evaluations.

2.4. Gender

Gender moderates many effects predicted in the preceding sections as men and women respond differently to stimuli including marketing communications (Meyers-Levy, 1989, Putrevu, 2001, Putrevu, 2004). These differences were attributed to biology, socialization, and information processing style. Biology suggested the human brain is divided into two hemispheres. Lateralization refers to the specialized functioning of each hemisphere. The left hemisphere specializes in verbal abilities and the right hemisphere in spatial perception (Hansen, 1981). At some point in development, lateralization begins, and one hemisphere becomes dominant in its control of behavior. The timing and extent of lateralization affects cognitive processing. Recent clinical and experimental research indicated that the two hemispheres were more integrated in females and more specialized in males (Everhart et al., 2001, Gorman et al., 1992, Saucier and Elias, 2001). More functionally lateralized male brains process information on a piecemeal basis, whereas more integrated female brains process information holistically. Hence, men likely value highly focused information along few key attributes while women likely value information-rich sources.

The selectivity hypothesis suggested that gender differences emerged because men look for overall message themes or schemas, whereas women engage in detailed elaboration of message content (Meyers-Levy, 1989, Meyers-Levy and Maheswaran, 1991, Meyers-Levy and Sternthal, 1991). Men were selective processors relying on heuristics in place of detailed message

elaboration. These heuristics involved one or a subset of cues that were highly available and salient, and implied a particular inference. In contrast, women were comprehensive processors who assimilated all available information. Unless restricted by memory constraints, females attempted effortful elaboration of all available information and gave equal weight to self-generated and other-generated information. In sum, the selectivity interpretation suggested that gender differences were due to differences in depth of processing.

An alternative viewpoint relates to differences in processing style. One type of elaboration is item-specific processing, which stresses attributes unique or distinctive to a message. This occurred spontaneously when people receive multiple message cues that are unrelated to each other. The second type is relational processing which emphasizes similarities or shared themes among disparate pieces of information. This occurred spontaneously when people receive many similar message cues (Einstein and Hunt, 1980, Hunt and Einstein, 1981). The sexes are socialized differently with men taught to value agentic sentiments and women communal sentiments (Eagly, 1987). Men, who were primarily concerned with self-focused agentic goals, more likely focused on message claims that affected them directly. Women, driven by relationship-oriented communal goals, more likely considered all message claims since they were interested in the message's overall impact. Hence, men undertook item-specific processing and women engaged in relational processing (Putrevu, 2001, Putrevu, 2004).

These gender differences could influence how men and women obtain and process online information and, hence, moderate the effects predicted in the hypotheses. For example, the influences of skills and challenge on exploratory behavior are likely stronger for women than men due to the female tendency to actively seek information. The male tendency to focus on piecemeal information suggests that the website structure would have a stronger influence on male attitudes compared to their female counterparts. Researchers reported that in traditional markets women spent more time shopping than men, seemed to enjoy it more, were more likely to make comparison shopping and bargain hunt (Wood, 1998). Since women were more likely to use websites for enjoyment and information gathering, they likely valued the effectiveness of such information. Hence, the relationship between effectiveness of information content and both website involvement and exploratory behavior should be stronger for females than for their male counterparts. Compared to women, men likely limit their information gathering to cues that are immediately relevant to the current context and, hence, men are more likely to stop their exploratory behavior as soon as they find it. Women might continue to explore the site for other related information. Therefore, the negative relationship between informativeness and exploratory behavior should be stronger for men than women. Since women enjoy the shopping process more and spend more time shopping and searching for information, they more likely appreciate the website entertainment value and engage in more exploratory behavior on such websites. As suggested by the ELM, attitudes formed on the basis of high elaboration are likely stronger than those where elaboration is low. Since women elaborate more on the information, the relationship between exploratory behavior and website attitudes is likely stronger for women than men. The effects of involvement on attitudes and pre-purchase evaluations likely transcend gender, i.e., higher involvement in the website likely engender positive attitudes and evaluations among both sexes.

The model was tested first, followed by a test of gender effects. The next sections describe the method, results, and major implications.

3. Method

Internet is a valuable communication tool in the health sector. Recent studies reported that 74% of women and 58% of men look for health and medical information online (Pew Internet and American Life Project Survey, 2005). Also, the objectives of pharmaceutical companies were geared towards influencing consumer attitudes rather than online sales. Hence, pharmaceutical websites provided an appropriate context for testing the hypotheses. An OTC drug website was selected as OTC drugs are generally considered to be search products with functional attributes.

3.1. Website and methodology

The data were collected from the homepage of an OTC drug from one of the largest companies in North America. Ipsos PharmTrends (2002) reported that it was ranked #2 with a 23% share of the US market, compared to the leader's 32% share. The structure of the site was a tree with a return-to-home button. Respondents received clear written instructions on how to access and surf the website, and answer the questionnaire. Respondents visited the site without artificial restrictions and completed the online questionnaire immediately thereafter. To obtain a larger sample, a snowball technique was used whereby willing participants passed on the written instructions to their friends or family and asked them to participate online. No reward was offered. In this method, the content was viewed in its actual form and in a realistic setting.

3.2. Questionnaire

A structured, non-disguised instrument was used to collect responses. It included items to measure the characteristics and effectiveness of the pharmaceutical website; gathered information on respondents' skills, challenge, exploratory behavior, site involvement, site attitudes, and pre-purchase evaluations. All variables were measured using five-point Likert scales, except for involvement which used five-point semantic differential scales (Table 1). Finally, demographics such as age, gender, and education were collected. All measures were drawn from previous research and adapted for the online context.

4. Analyses and results

4.1. Sample characteristics

The sample size was 261 (145 females and 116 males). All age and education groups were represented but the sample was somewhat skewed toward younger and more educated consumers. There were no gender differences across age ($p = .383$) or education ($p = .115$) groups.

4.2. Exploratory factor analyses

With exploratory factor analysis, we identified and removed items with poor psychometric proprieties (i.e., loadings < .50, cross-loadings > .30). We conducted a second EFA on remaining items using principal axis factoring with varimax rotation. We obtained 10 factors with eigenvalues > 1, accounting for 71% of total variance (Table 1). All extracted factors had acceptable reliabilities, with Cronbach's alphas at/above the .70 threshold.

Table 1. Exploratory factor analysis.

Constructs	Items	Factor loadings	Cronbach alpha
Skills (SKIL)	• I am very skilled at using the Web.	0.945	0.91
	• I am considering myself very knowledgeable about good search techniques on the Web.	0.886	
Challenge (CHAL)	• Using the Web is a great challenge for me.	0.739	0.80
	• Using the Web provides an excellent test of my skills.	0.765	
	• I find that using the Web stretches my capabilities to the limits.	0.750	
Exploratory behavior (EXPB)	• When I hear about a new Web site, I'm always eager to check it out.	0.656	0.70
	• I like to browse the Web and find out about the latest sites.	0.811	
Entertainment (ENT)	• Exciting site.	0.807	0.84
	• Imaginative site.	0.797	
	• Entertaining site.	0.803	
Informativeness (INF)	• Informative site.	0.816	0.88
	• Useful site.	0.921	
	• Resourceful site.	0.796	
Effectiveness of information content (EFIC)	• Information is accurate.	0.795	0.79
	• Information is up-to-date.	0.718	
	• Product information is complete.	0.690	
Site structure (STR)	• The structure is well-organized.	0.877	0.84
	• It allows a great overview of its structure.	0.840	
	• The structure is straightforward.	0.698	
Site involvement (INV)	• Important to me…Unimportant to me.	0.818	0.87
	• Worth remembering…Not worth remembering.	0.790	
	• Relevant to my needs…Irrelevant to my needs.	0.777	
	• Worth paying attention to…Not worth paying attention to.	0.805	
Website attitudes (ATTI)	• This Web site makes it very easy for me to build a relationship with the company.	0.675	0.85
	• Surfing the Web is an excellent way for me to spend my time.	0.779	
	• I was smiling while I was exploring this Web site.	0.795	
	• I was part of a like-minded group of people while using this Web site.	0.664	
	• This Web site was a playful experience.	0.762	
Pre-purchase evaluation (PPEV)	• It takes a very long time to decide before buying drugs.	0.514	0.71
	• I get as much information as possible before purchasing a drug.	0.689	
	• I always compare product characteristics among brands of a specific drug.	0.682	
	• Before looking at this site, I was interested in reading about the needed drug.	0.584	

4.3. Confirmatory factor analyses

The full latent model (Fig. 2) was specified using results from the EFAs and tested using EQS (Bentler, 1992) to simultaneously estimate its measurement and relational properties. Acceptable model fits are indicated by relative (standardized $\chi 2$ [$\chi 2/df$] and comparative fit index [CFI]) and absolute (root mean-square error of approximation [RMSEA]) indices. The cutoff values for acceptable fit are CFI > .90 (Bentler, 1992), $\chi^2/df < 5$, and RMSEA < .05 (Taylor and Todd, 1995).

The ten-factor structure was confirmed with a first-order CFA. Findings demonstrated good fit of the measurement model to the data according to relative ($\chi^2/df = 1.37$ and CFI = .98) and absolute (RMSEA = .038) fit indices. Convergent validity was established if the average variance extracted (AVE) for each factor accounted for ≥ 50% total variance (Fornell and Larcker, 1981). The AVE varies from 0.39 to 0.84, with only pre-purchase evaluations explaining < 50%. A further test of convergent validity was the existence of statistically significant path coefficients (Anderson and Gerbing, 1988): all are significant. Discriminant validity is established if AVE is larger than the squared correlation coefficients between factors (Fornell and Larcker, 1981): this criterion was met across all pairs of factors. A more stringent test of discriminant validity was also conducted, consisting of chi-square tests between two models: one in which the correlation between two constructs is freely estimated, and the other where the correlation is fixed at 1.0. Results from LaGrange Multiplier (LM) tests indicated no significant cross-loadings for measurement items with non-hypothesized constructs, supporting discriminant validity. The 10 factors were distinct and valid instruments.

4.4. Structural model testing

A joint model for the causal relationships among all variables (Fig. 2) was tested with all observations ($N = 261$) using EQS. This model fitted the data very well, with $\chi^2/df = 1.4$; CFI = .98; RMSEA = .037. Such high values (CFI > .95) are indicative of an excellent fit (Hu and Bentler, 1999).

The results provided strong support for the conceptual model depicted in Fig. 1. In particular, most aspects of H1, H3, H4, H5, H6, and H7 were supported. Only H2 was not supported. First, exploratory behavior (EXPB) was positively influenced by entertainment (ENT) (.256, $p < .01$), challenge (CHAL) (.305, $p < .01$), skills (SKIL) (.343, $p < .001$), and effectiveness of information content (EFIC) (.313, $p < .01$), and negatively related to informativeness (INF) (−.183, $p < .05$). Second, site involvement (INV) was positively related to entertainment (.312, $p < .001$) and effectiveness (.260, $p < .01$). Third, most effects of website characteristics on website attitudes (ATTI) were partially or fully mediated by involvement and exploratory behavior. Specifically, entertainment impacted attitude both directly (ENT → ATTI: .369, $p < .001$) and indirectly via site involvement (ENT → INV: .312, $p < .001$; INV → ATTI: .242, $p < .001$) and exploratory behavior (ENT → EXPB: .256, $p < .01$; EXPB → ATTI .217, $p < .01$). Similarly, challenge had both direct (CHAL → ATTI: .226, $p < .01$) and indirect influences on attitude through exploratory behavior (CHAL → EXPB: .305, $p < .01$; EXPB → ATTI: .207, $p < .01$). However, the relationship between skills, informativeness, and effectiveness with attitudes were fully mediated by exploratory behavior and/or site involvement (SKIL → EXPB:

.343, $p < .001$; INF → EXPB: −.183, $p < .10$; EFIC → EXPB: .313, $p < .01$; EXPB → ATTI: .217, $p < .01$; and EFIC → INV: .260, $p < .01$; INV → ATTI: .242, $p < .001$). Finally, pre-purchase evaluation (PPEV) was significantly influenced by site involvement (.420, $p < .001$) and challenge (.278, $p < .01$).

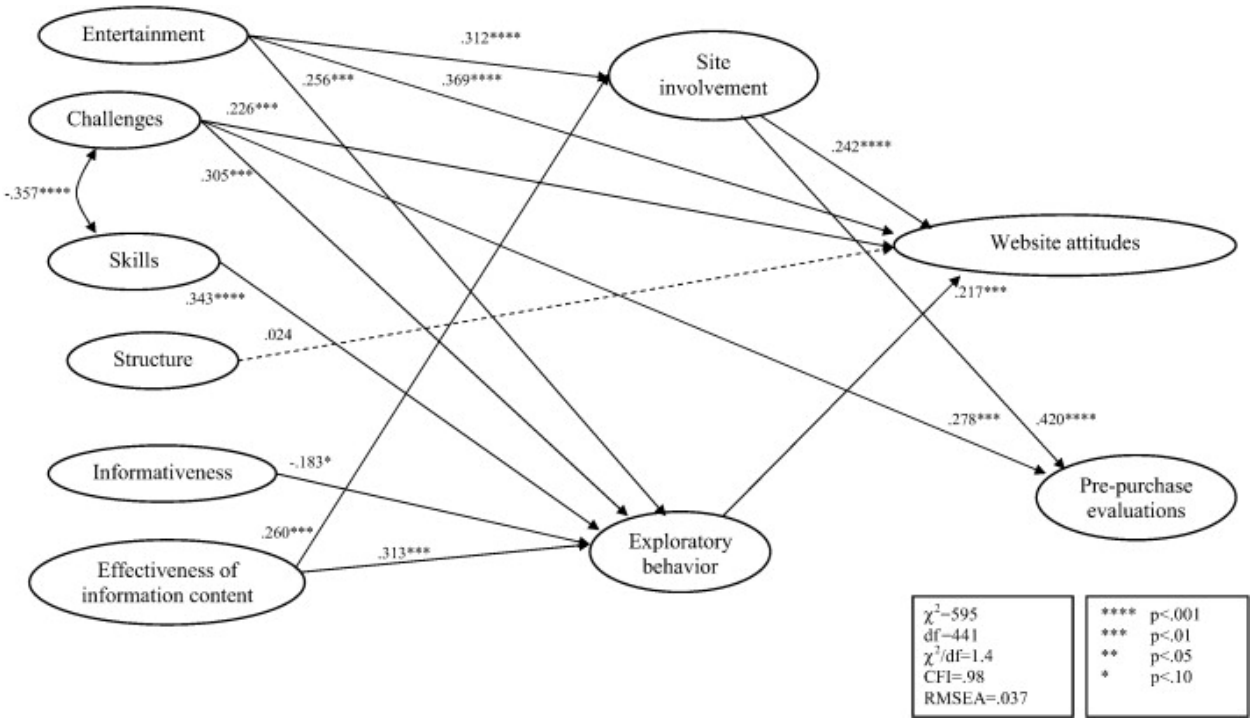

Fig. 2. Overall model of online consumer behavior.

Analyses using EQS were performed to test model invariance between males and females. Prior to conducting these tests, it is customary to establish separate baseline models for each group. Two additional levels of constraints (i.e., measurement and structural) were introduced to test their equality simultaneously (Byrne, 1994). Two structural models were tested, one for males ($N = 116$), another for females ($N = 145$). These models, with corresponding fit indices and standardized parameter estimates, are depicted in Figs. 3. The overall goodness-of-fit was excellent for both male ($\chi^2/df = 1.3$, CFI = .97) and female models ($\chi^2/df = 1.2$, CFI = .97). For both, all measurement paths were significant and 11/14 causal paths were significant and in the hypothesized directions.

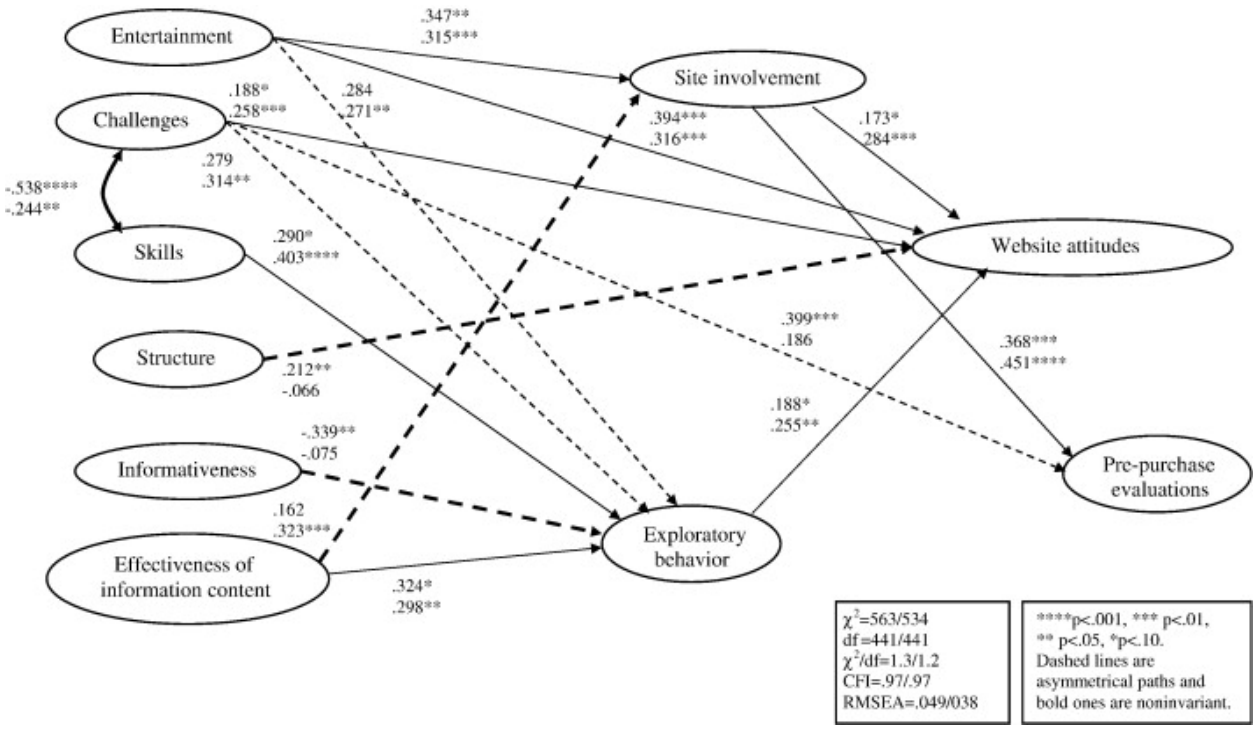

Fig. 3. Male and female models of online consumer behavior.

4.4.1. Invariance tests

The model proposed that the nature and strength of the relationships among the variables differed across male and female groups. As expected, six asymmetric paths (i.e., causal paths that were significant for males but not for females, and vice versa) were found across the baseline models. Specifically, CHAL → PPEV, STR → ATTI, and INF → EXPB were significant only for males but not for females, whereas ENT → EXPB, CHAL → EXPB, and EFIC → INV were significant only for females but not for males. These findings were consistent with our gender-based predictions.

However, this conclusion might be misleading if males and females did not perceive the indicators the same way. If measure invariance was not established, conclusions drawn from these scales are "at best ambiguous and at worst erroneous" (Steenkamp and Baumgartner, 1998). Hence, before further testing causal path invariance, measurement-level constraints (i.e., configural, metric, factor covariance, and error variance invariances) were introduced to test the equality across males and females simultaneously by multisample CFAs using covariance matrices test (Byrne, 1994).

Model M1: *Configural invariance*. The factor loadings matrix (**Λ**), the factor covariance matrix (**Φ**), and the error variance matrix (**Θ**) are all of the same order, but freely estimated without restriction in each group.

M2: *Metric invariance*. **Λ**(males) = **Λ**(females), but **Φ** and **Θ** are freely estimated without restriction in each group.

M3: *Factor covariance invariance*. **Φ**(males) = **Φ**(females), but **Λ** and **Θ** are freely estimated without restriction in each group.

M4: *Error variance invariance*. **Θ**(males) = **Θ**(females), but **Λ** and **Φ** are freely estimated without restriction in each group.
M5: *M2 and M3*. **Λ**(males) = **Λ**(females), and **Φ**(males) = **Φ**(females), but **Θ** is freely estimated without restriction in each group.
M6: *M2 and M4*. **Λ**(males) = **Λ**(females), and **Θ**(males) = **Θ**(females), but **Φ** is freely estimated without restriction in each group.
M7: *M2, M3 and M4*. **Λ**(males) = **Λ**(females), **Φ**(males) = **Φ**(females), and **Θ**(males) = **Θ**(females).

The results are summarized in Table 2. Since M1 is the least restrictive, M2:, M3:, M4:, M5:, M6:, M7: which contained different sets of constraints were nested in M1. Chi-square difference tests identified the best model to represent common measurement properties. M2:, M3:, M5: were not different from baseline: $\chi_d^2(22) = 29.62$, $p = .13$; $\chi_d^2(10) = 11.76$, $p = .30$; $\chi_d^2(32) = 35.15$, $p = .32$. Among these, M5 was nested in M2:, M3:. Additional model comparisons presented no significant chi-square differences between M2:, M3: [$\chi_d^2(12) = 17.86$, $p = .12$], M2:, M5: [$\chi_d^2(10) = 5.53$, $p = .85$], or M3:, M5: [$\chi_d^2(22) = 23.44$, $p = .38$]. M5 (both metric and factor covariance invariances) best represented the common measurement properties for males and females, suggesting that these factors had at least the same factor patterns, structure, and covariances across the two samples. The measurement invariance model fitted the data very well, with $\chi^2/df = 1.2$, CFI = .97.

Table 2. Tests of measurement invariance between males and females (Multisample CFAs).

Models	**Goodness-of-fit indices**			
	χ^2	*df*	*p*-value	CFI
M1: configural invariance	1103	882	.000	.97
M2: **Λ**(males) = **Λ**(females)	1133	904	.000	.97
M3: **Φ**(males) = **Φ**(females)	1115	892	.000	.97
M4: **Θ**(males) = **Θ**(females)	1163	917	.000	.97
M5: **Λ**(males) = **Λ**(females) **Φ**(males) = **Φ**(females)	1138	914	.000	.97
M6: **Λ**(males) = **Λ**(females) **Θ**(males) = **Θ**(females)	1194	939	.000	.97
M7: **Λ**(males) = **Λ**(females) **Φ**(males) = **Φ**(females) **Θ**(males) = **Θ**(females)	1210	954	.000	.96
Model comparisons	**Difference**			
	χ^2	*df*	*p*-value	
M2 vs. M1	29.62	22	.13	
M3 vs. M1	11.76	10	.30	
M4 vs. M1	60.08	35	.01	
M5 vs. M1	35.15	32	.32	
M6 vs. M1	91.11	57	.00	
M7 vs. M1	106.6	72	.01	
M2 vs. M3	17.86	12	.12	
M2 vs. M5	5.53	10	.85	
M3 vs. M5	23.44	22	.38	

To add a more stringent test of the hypotheses, multiple-group analysis was conducted to test the equality of measurement and structural paths by imposing equality constraints on parameters of the two models (Byrne, 1994). As shown in Table 3, these models were different in the STR → ATTI path, i.e., structure had a significant impact on attitudes (.212, $p < .05$) for males,

but not for females (−.066, $p > .15$). Using one-tailed *t*-tests, two other asymmetric paths were also significantly different between males and females: one between informativeness and exploratory behavior, with a negative relationship for males but not for females (−.339 vs. −.075, $p < .10$) and the other between effectiveness of information content and site involvement, where it is significant for females but not for males (.323 vs. .162, $p < .10$). Hence, men and women perceive the indicators similarly but respond to them differently.

Table 3. Invariance tests across gender.

Hypothesized causal paths	Standardized β values[a]		Path differences: Chi-square (*p*-value)
	Males	Females	
H1a: Skills ⟶ Exploratory behavior	.290*	.403****	.001(.48)
H1b: Challenge ⟶ Exploratory behavior	.279 (*t* = 1.23)	.314**	.288(.25)
H1c: Challenge ⟶ Website attitudes	.188*	.258***	.894(.34)
H1d: Challenge ⟶ Pre-purchase evaluations	.399***	.186 (*t* = 1.62)	.214(.32)
H2: Structure ⟶ Website attitudes	.212**	-.066 (*t* = -.81)	4.388[b](.02)
H3a: Effectiveness of information content ⟶ Exploratory behavior	.324*	.298**	.580(.23)
H3b: Effectiveness of information content ⟶ Site involvement	.162 (*t* = 1.20)	.323***	2.167[b](.07)
H4: Informativeness ⟶ Exploratory behavior	-.339**	-.075 (*t* = -.59)	1.877[b](.08)
H5a: Entertainment ⟶ Exploratory behavior	.284 (*t* = 1.52)	.271**	.039(.42)
H5b: Entertainment ⟶ Site involvement	.347**	.315***	.102(.75)
H5c: Entertainment ⟶ Website attitudes	.394***	.316***	.697(.40)
H6: Exploratory behavior ⟶ Website attitudes	.188*	.255**	.151(.35)
H7a: Site involvement ⟶ Website attitudes	.173*	.284***	.068(.79)
H7b: Site involvement ⟶ Pre-purchase evaluations	.368***	.451****	.570(.45)
Fit indices	$\chi^2(441) = 563$, $p<.001$; $\chi^2/df = 1.3$; CFI = .97	$\chi^2(441) = 534$, $p<.001$; $\chi^2/df = 1.2$; CFI = .97	$\chi^2(919) = 1143$, $p<.001$; $\chi^2/df = 1.2$; CFI = .97

**** $p < .001$.
*** $p < .01$.
** $p < .05$.
* $p < .10$.
[a] Asymmetric paths (i.e., significant in one category but not in the other) are shaded.
[b] *p*-values (one-tail tests) indicate significant difference between pairs of causal paths.

5. Discussion

Most hypotheses related to the impact of Internet experience and web atmospherics on online behavior and outcome variables were supported by the data. As expected, antecedent variables (Internet experience and web atmospherics) drove online behavior (website involvement and exploratory behavior) which drove outcomes (website attitudes and pre-purchase evaluations). As hypothesized, gender was found to act as a moderator of six of the major paths, all related to antecedent variables. There were no gender differences among the online behavioral variables.

For the overall model, skills and challenge had a positive influence on exploratory behavior as predicted by H1. Structure did not have an impact on website attitudes, rejecting H2. As expected in H3, effectiveness of information content had a positive influence on exploratory

behavior and website involvement. In line with H4, higher levels of informativeness led to lower levels of exploratory behavior. As predicted by H5, the hedonic or entertainment aspects of the website had positive influences on exploratory behavior, website involvement, and website attitudes. Consumers who indulged in higher levels of exploratory behavior had more positive website attitudes, supporting H6. Consistent with H7, website involvement was a key determinant of attitudes and pre-purchase evaluations.

Novak et al. (2000) reported that skills and challenge influenced online search and purchase behavior. However, this research suggested that these variables had a significant impact on female exploratory behavior, but only skills seemed to influence male exploratory behavior. These findings are consistent with gender differences proposed by Putrevu, 2001, Putrevu, 2004: males relied on their skills to navigate websites quickly and efficiently to obtain select pieces of information, whereas females enjoyed facing the various challenges as they conduct thorough search to gather all relevant information before making a decision.

As expected, higher levels of challenge led to a better evaluation of the websites for both sexes. In addition, males' challenge influenced site attitudes and pre-purchase evaluations, while females' challenge influenced only website attitudes. The direct impact of challenge on pre-purchase evaluations for males indicated that once men found the site challenging, along with relevant information, they found the product attractive and reported higher pre-purchase evaluations. The lack of such direct relationship for females was consistent with the finding that males were more prone to quick online decisions, while females used the Internet to gather information and later decided whether to buy in a brick-and-mortar store or elsewhere (Wolin and Korgaonkar, 2003). We found a *negative* covariance between skills and challenge, i.e., skills increased more rapidly than challenge. This was more significant for men, as the covariance between skills and challenge is more negative that for females (i.e., the difference was *significant* at $p < .01$), indicating that for the same level of skills, females feel more challenged than males.

As predicted, website attitudes were impacted by website structure for men but not women. The easier a website was to use, the more cognitive capacity was available to process information (Griffith, 2005). This was consistent with research that suggested that men preferred simple, straightforward information whereas women were more receptive to complex information (Meyers-Levy and Maheswaran, 1991, Putrevu, 2001, Putrevu, 2004). Contrary to expectations, effectiveness of information content influenced exploratory behavior of both sexes equally but, as expected, it influenced website involvement of women and not men. Thus, effectiveness of information content had a stronger overall effect for women due to its impact on both exploratory behavior and website involvement. Further, the positive path between structure and website attitudes and negative path between informativeness and exploratory behavior among male respondents suggested that male attitudes were driven by website structure and that men limited their information gathering. These results were consistent with previous research suggesting that men processed information in a heuristic and/or piecemeal manner, whereas women undertook more detailed elaboration of message arguments (Meyers-Levy and Maheswaran, 1991, Putrevu, 2001, Putrevu, 2004). Thus, for female audiences it is important to create websites with a lot of information presented in varied formats, with many links to related

topics. For male audiences, it might be prudent to keep it simple, limit the information to key issues, provide an overall summary and visual reinforcement of verbal information.

As predicted, entertainment of a website influenced exploratory behavior of females but not males. This was consistent with the reasoning that highly entertaining websites make for more pleasurable visits especially for women who spend time and efforts to gather information online. However, this hedonic characteristic did not translate into higher website involvement or attitudes for either sex. Interestingly, no gender differences were observed between exploratory behavior and website attitudes. Contrary to expectations, despite indulging in more exploratory behavior women did not form stronger website attitudes. As predicted by ELM, website involvement had a positive influence on attitudes and pre-purchase evaluations for both sexes.

6. Conclusions and implications

The three key variables that drove website attitudes were website involvement, entertainment, and challenge. Further, pre-purchase evaluations were driven by website involvement and challenge. Website involvement, in turn, was driven by effectiveness of information content and entertainment. While exploratory behavior was influenced by antecedent variables, its effect on attitudes was less pronounced. Hence, the most effective websites were those that are entertaining, moderately challenging, and current. In addition, men and women differed in their web navigation behavior. Males, as heuristic or item-specific processors, preferred straightforward information presented through a website that is well-structured and easy to access and process. The primary drivers for males were good entertainment, challenge, and structure. The combined impact of skills, informativeness, and effectiveness of information content on exploratory behavior was weaker and secondary. If the main audience is male, the website should be efficiently designed to develop positive site involvement and attitudes, and generate positive pre-purchase evaluations. Women, as comprehensive or relational processors, engaged in more exploratory behavior and became more involved with the website content. If the main audience is female, the website should be designed to encourage and support exploratory behavior through provision of detailed information, entertainment, and attributes that stimulate both the skills and challenge of females. For example, the use of multiple links to related content could be useful when targeting women. When the audience is composed of both sexes, the key is to engender website involvement as this drives attitudes and pre-purchase evaluations of both men and women.

The study had limitations. The sample was a snowball sample which limited generalizability and external validity. Further, as with other Internet-based studies, it was skewed toward younger, more educated demographics. However, such consumers are the main audience for online marketers. The sample size was modest, especially when the analysis was restricted to one gender. While the results were consistent with the hypotheses, a larger sample size might have resulted in stronger results. Finally, a single product exemplar was used.

A starting point for future research is to use more representative samples and additional product/brand exemplars. It would be useful to explore whether variables such as need for cognition, mood, and culture influence web navigation behavior. While pharmaceutical companies are not allowed to sell directly to consumers, such restrictions are not placed on

products from other industries. Based on product contexts, one could examine whether superior attitudes and pre-purchase evaluations lead to higher sales (online and offline). Given the increasing importance of the Internet for both information and sales, advertisers would benefit from understanding how consumers respond to information presented in this growing medium.

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