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Perceived irritation in online shopping: The impact of website design characteristics

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A B S T R A C T

Perceived irritation has shown negative effects on various aspects of consumer shopping behavior. Despite the enormous proliferation of online shopping in recent years, very little research has explored perceived consumer irritation or its determinants in online shopping environments. This study aims to fill this gap by examining the effects of visual, navigational, and informational website design characteristics on consumers' perceived irritation in online shopping activities. The results of data collected from online shoppers showed that the three website design characteristics had significant negative effects on perceived irritation in online shopping context. These findings offer valuable implications for website designers and online retailers who wish to design and maintain attractive websites that can minimize perceptions of irritation among current and potential customers.

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1. Introduction

Perceived irritation has demonstrated negative effects on various aspects of consumer purchasing behavior such as satisfaction, trust, attitude, purchasing intention, and eventual buying behavior (Azeem, 2012; d'Astous, 2000; Gao & Wu, 2010). In traditional and face-to-face shopping, feelings of irritation among consumers develop from unfriendly interactions with the shopping environment elements such as the store attributes, store personnel, or other customers (Thota, 2012). As such, the role of the shopping environment in provoking feelings of irritation among consumers has been widely recognized and investigated in the literature especially in traditional shopping (Aaker & Bruzzone, 1985; d'Astous, 2000; Ducoffe, 1996; Eroglu, Machleit, & Davis, 2001; Thota, 2012). A comprehensive literature review by Turley and Milliman (2000) corroborate the importance of stores' attributes in influencing consumers' shopping beliefs and behaviors. Consequently, businesses frequently arrange and reorganize the physical layout and attributes of their stores in a careful manner to induce positive effects on their customers and to mitigate any potential consumer irritation (Ergolu et al., 2001). However, while online shopping has become a dominant commercial medium for consumers and retailers alike (Bao, Bao, & Sheng, 2011), perceived

irritation in online shopping environments has not been sufficiently investigated in the literature (Gao & Koufaris, 2006). Thus, perceived irritation deserves further investigation and better understanding in online shopping contexts.

The concept of consumer irritation can be extended to online shopping contexts and, like in traditional shopping environments; it provokes negative effects on a wide range of perceptions and feelings among online customers (Gao & Koufaris, 2006; Huang, 2008; Lim, 2013; Luo, 2002). When a customer encounters an unpleasant situation and feels irritated (whether at a conventional or virtual store), the customer abandons the shopping cart and leaves the store without making a purchase. In addition to abandoning the current purchase, such irritative and annoying experiences can have a lingering and adverse effect on consumers' beliefs about retailers' trust, benevolence, competence, dependability, and integrity (Gao & Wu, 2010; Thota, 2012). Given the easiness and speed at which consumers can leave a commercial website and defect to a competitor's site (O'Brien & Toms, 2008; Wu, Chen, Chen, & Cheng, 2014), the issue of irritation becomes even more relevant and detrimental to online shopping.

In the virtual business world, a website interface serves as a window through which consumers encounter their initial experiences with an online retailer (Zhang & van Darn, 2002). All subsequent interactions between the consumer and the online retailer are accomplished through the website's interface (Karimov, Brengman, Van Hove, & Van, 2011; Shih, 2004; Wells, Valacich, &

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Hess, 2011). Accordingly, the design elements of online virtual store have similar, even more important, effects on consumers' beliefs and attitudes as the design elements and arrangements in a conventional store (Liang & Lai, 2002). It has been shown that poorly-designed websites irritate their users and impede navigation of the site, finding products, and purchase behavior (Gao & Koufaris, 2006; Gao & Wu, 2010; Huang, 2008; Wells et al., 2011). Although website design characteristics represent the basic atmospheric building blocks that can be carefully manipulated to communicate positive signals to enhance shoppers' perceptions and attitudes (Koo & Ju, 2010; Manganari, Siomkos, & Vrechopoulos, 2009), investigations of the effects of website design factors on perceived irritation in online shopping are exceptionally scarce in the literature.

To enhance consumers' online shopping behavior, it is crucial for businesses to have a better understanding of not only factors that stimulate positive and pleasing feelings among consumers but also factors that arouse negative emotions and reactions among customers which could ultimately impede online shopping behavior (Azeem, 2012). Accordingly, the present study aims to address the research void described above and provide a better understanding of the impact of website design elements on perceived irritation in online shopping environments. More precisely, the intent of this study is not to examine all website design elements which is extremely difficult to do in a single study, but rather it aims to focus on key website design characteristics that are most apparent to and used by consumers; namely visual, navigation, and information website designs. Undoubtedly, understanding how website design characteristics affect feelings of irritation in online shopping will provide valuable implications for designing better websites that can be more effective in reducing perceptions of irritation among online consumers and can subsequently increase acceptance of online shopping.

2. Research model and hypotheses

Fig. 1 presents the research model guiding this study. The research model was developed based on conceptual and empirical studies in related disciplines. As Fig. 1 shows, the model posits that visual, navigation, and information website design characteristics will have negative effects on perceived irritation in online shopping settings. The research variables and hypotheses are described below.

2.1. Perceived irritation

Consumer irritation refers to the feelings of displeasure, discomfort and infuriation that are caused by provoking or annoying stimuli such as incidents, messages, or interactions that may go against what a consumer expects or anticipates in a particular situation (Ducoffe, 1996). Thus, perceived irritation in online shopping environments refers to the degree to which an online shopping site appears messy and frustrating to its users (Lim & Ting, 2012). Although very few studies have examined consumer irritation with respect to online shopping (Gao & Koufaris, 2006), almost all studies used perceived irritation as a determinant to other factors and, thereby, focused on the consequences of perceived irritation (Lim, 2013; Lim & Ting, 2012; Luo, 2002; Xu, Oh, & Teo, 2009). Such studies have shown that perceived irritation had negative effects on online consumers' attitude, satisfaction, word of mouth, intention to return, perceived ease of use, and purchasing behavior (Hausman & Siekpe, 2009; Huang, 2008; Jere & Davis, 2011; Thota, 2012). Moreover, perceived irritation had negative effects on vendor-related factors such as credibility, competence, dependability, and integrity (Gao & Wu, 2010). Despite the numerous negative outcomes attributed to perceived irritation in online shopping, there has been little or no research effort aimed at examining determinants of perceptions of irritation among online shoppers.

As posited earlier, consumers develop feelings of irritation primarily from their unfavorable interactions and experiences with the shopping environment (Aaker & Bruzzone, 1985). In comparison, perceptions of irritation in online shopping arise from unpleasant interactions with the shopping website. Because the website's interface operates as the 'online storefront' with which users interact and upon which they develop their first impressions about the virtual store or vendor (McKnight, Choudhury, & Kacmar, 2002), the site's interface design has substantial effects on perceptions of irritation (Wells et al., 2011). For instance, websites that are informative, visually appealing, easy to navigate and use seem to enhance users' involvement with the site and are less likely to instigate feelings of irritation among users (Gao & Wu, 2010). In contrast, a messy and poorly-designed website drains users' attention, requires more effort and cognition to use, and evokes negative feelings that may cause irritation among users because they are unable to navigate the website, find products, or complete a purchase task (Azeem, 2012; Chen & Wells, 1999; Gao & Wu, 2010).

2.2. Website design

The ability of a traditional store to fulfill consumers' expectations through careful design of physical, social, and aesthetic elements is analogues to a website's ability to attract and retain online consumers through carefully-designed website screens and interfaces (Eroglu et al., 2001; Rosen & Purinton, 2004). Previous studies suggest that the impact of website design on online shopping is as important to consumers as the effects of good service and low prices in traditional retailing (Koufaris, 2002). Website design plays even a greater role in online purchasing than the service provided to customers in traditional stores. In online shopping, consumers experience and evaluate the quality of service, as it is manifested by the site's interface design, before they make purchases (Zhang & von Dran, 2002). Moreover, past work shows that consumers are more likely to visit and buy from better-designed websites (Mithas, Ramasubbu, Krishnan, & Fornell, 2007). Accordingly, website design characteristics play a key role in developing consumers' initial beliefs and subsequent purchasing behavior (Cheung, Chan, & Limayen, 2005; Karimov et al., 2011; Wells et al., 2011) and communicating product and vendor qualities to consumers (Wells et al., 2011). Thus, developing pleasing and organized shopping websites is crucial for enhancing consumers' beliefs and attracting online customers (Ahn, Ryu, & Han, 2007; Chang & Chen, 2009).
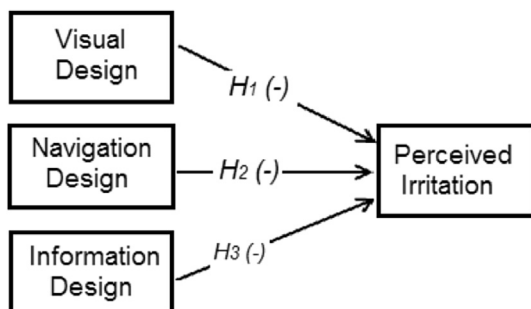

Fig. 1. Research model.

While website design characteristics affect numerous cognitive and motivational aspects of online shopping behavior (Chen & Wells, 1999; Manganari et al., 2009; Mithas et al., 2007; Wells et al., 2011), the majority of past studies have consistently focused on examining customers' positive perceptions and beliefs. In this stream of research, website design was examined as a determinant of trust (Gao, Koufaris, & Ducoffe, 2004), satisfaction (Cyr & Bonanni, 2005), product/vendor quality (Wells et al., 2011), attitude (Chen & Wells, 1999), enjoyment (Childers et al., 2002), arousal and emotions (Koo & Ju, 2010), online shopping quality (Ha & Stoel, 2008), and purchase intention (Ganguly, Dash, Cyr, & Head, 2010). In comparison, limited research, if any, exists on the impact of website design on customers' negative perceptions that discourage people from shopping online (Huang, 2008). Accordingly, by focusing on a negative psychological construct (i.e., perceived irritation) that impedes online shopping, this study offers a worthwhile attempt to balance and complement previous research.

Given the numerous website design factors that are relevant to online shopping, determining what features or elements comprise a website's interface design remains an undecided issue in the literature (Ganguly et al., 2010). However, past studies point out that key website design characteristics include information, navigation and visual components (Cyr, 2008; Gao & Koufaris, 2006; Richard, 2005; Zhang & von Dran, 2002). These website design components offer consumers the most visible and apparent features to interact with while using the website and upon which they form their perceptions and beliefs about their online experiences (McKnight et al., 2002). Form a consumer's perspective, these design elements capture all the aspects of a website with which a user interacts such as functionality, structure, and content of website.

2.2.1. Visual design

The visual design of a website refers to the consistency, aesthetic, and the attractiveness of the website's appearance including images, colors, fonts, shapes, animations, and layout (Cyr & Bonanni, 2005; Li & Yeh, 2010). Website visual design is a key component of website quality (Vance, Elie-Dit-Cosaque, & Straub, 2008) and affects users' experiences while using and interacting with the site (Wells et al., 2011). Past research shows that the visual design of a shopping website affects various enablers of online buying behavior such as perceived ease of use, perceived usefulness, perceived enjoyment, and ultimate acceptance of online shopping (Kim & Stoel, 2004; Li & Yeh, 2010; Monsuwé, Dellaert, & De Ruyter, 2004). Cyr, Head, Larios, and Pan (2009) suggest that the visual appeal of a shopping website is significant because it boosts users' excitement and emotional appeal and leads to more satisfying engagement with the site. Finally, Wells et al. (2011) suggest that attractive visual website design sends positive messages to consumers about the quality of product and the vender. Accordingly, an attractive website visual design should enhance consumers' beliefs about the site and will have a negative impact on perceived irritation.

H1. *Higher perceptions of website visual design will have a negative effect on perceived irritation in online shopping.*

2.2.2. Navigation design

The navigation design of a website refers to the organization and structural layout of the site's pages and content. A sites navigation design has a significant impact on the amount of effort required for a user to navigate or use the website (Vance et al., 2008). Thus, an efficient navigation design of a website should provide an easy to use navigation hierarchy that allows users to go to the desired pages easily and quickly from anywhere in the site and with

minimal amount of effort (Montoya-Weiss, Voss, & Grewal, 2003). Navigation design plays a significant role in influencing customers who do not like to be overwhelmed with unnecessary screens, links, options, or clicks. Online consumers prefer simple and direct navigation design that saves them time and effort in finding what they look for and helps them complete purchase transactions with a minimum number of steps. An ambiguous and unclear navigation design of a website disturbs users and causes them to lose sense of location at the site and, as a result, they may leave the site with no intention to buy or return. Past studies suggest that efficient navigation design should help users navigate and traverse the site (Shergill & Chen, 2005; Zahedi & Song, 2009). Thus, an efficient website navigation design is expected to have a negative impact on perceived irritation.

H2. *Higher perceptions of website navigation design will have a negative effect on perceived irritation in online shopping.*

2.2.3. Information design

A website's information design refers to the site's ability to deliver relevant, current, and easy-to-understand information to its users (Lee & Kozar, 2006). Information design is positively related to perceived ease of use, usefulness, and ultimate acceptance of online shopping (Shih, 2004). Because online purchase transactions involve substantial amounts of information related to products, services, payment, delivery, and vendors (Montoya-Weiss et al., 2003), the availability of sufficient and relevant information increases trust in online shopping and enhances purchase intention (Gao & Wu, 2010). Thus, the availability of necessary information and the ease of finding and accessing this information can enhance consumers' decision-making and purchasing tasks (Lin, 2007). In contrast, when consumers are exposed to information that may not be relevant or helpful to the task they want to perform, they become dissatisfied and develop feel irritated because of the time and cognitive effort and resources that they spent in processing the information (MacKenzie & Spreng, 1992). Therefore, an efficient and helpful website information design is expected to have a negative impact on perceived irritation.

H3. *Higher perceptions of website information design will have a negative effect on perceived irritation in online shopping.*

3. Methodology

3.1. Participants and procedure

To empirically test the research hypotheses, data were collected from a sample of 93 students enrolled in undergraduate and graduate business courses at a Midwestern four-year public university. About 44 percent of the participants were females ($N = 41$) and the remaining 56 percent were males ($N = 52$). The age of participants ranged from 19 to 41 ($M = 22.04$; $SD = 3.43$). All participants indicated that they had made more than one online purchase in the past 12 months.

An online purchase simulation experiment was used to test the research hypotheses. A real e-commerce website that sells apparel products was used to perform the experimental task and assess participants' perceptions of the site's design characteristics and perceived irritation. To eliminate any potential confounding effects of site familiarity and prior experience with vendor, the target website was shown to the participants prior to the experiment and all participants indicated that they have not seen or used the website before. Then, participants were asked to simulate a purchase of a white dress shirt as gift for a male friend. Accordingly,

participants were required to: (1) search for and locate the specified clothing product, (2) evaluate the product's attributes, (3) perform the first few steps of placing an online order to buy the shirt, and (4) cancel the purchase transaction when they were required to provide personal or financial information such as names or credit card numbers. After finishing the experimental task, participants completed the research questionnaire.

3.2. Measurements

The measurement scales used to assess the study variables were adapted from previous work on website design and consumer irritation. Website design characteristics were measured by thirteen statements adapted from previous studies (e.g. Cyr & Bonanni, 2005; Ganguly et al. 2010). Accordingly, website's visual design was measured with five statements. A sample statement from this scale is: "The screen design on this website (i.e., colors, images, layout, etc.) is attractive". Information design was measured with four statements. A sample statement to measure information design is: "This website displays a lot of useful information". Navigation design was measured with four statements. A sample statement from this instrument is: "This website provides good navigation links and menus". Finally, perceived irritation was measured with three statements utilized from previous studies (Gao & Koufaris, 2006; Gao & Wu, 2010; Lim & Ting, 2012; Luo, 2002). A sample statement to measure perceived irritation in online shopping is: "I feel that most online shopping websites are irritating". Responses to all the measurement statements were recorded on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

4. Results

Although this study used measures that were validated in previous work, a reliability and confirmatory factor analysis was performed on all multi-item measurement scales. As the results in Table 1 show, all measurement items loaded properly on their intended factors and all convergent validity factor loading values were well above .5; indicating high construct validity. Similarly, items' loading values on unintended constructs were below .4; indicating high discriminant validity. Next, the internal consistency reliabilities were assessed with Cronbach's alpha (α). As Table 1 shows, all alpha values ranged from .864 to .919; indicating high internal consistency reliability.

Table 1
Results of reliability and factor analysis.

Measurement item	Factor				Alpha
	1	2	3	4	
Visual 1	**.689**	.260	.274	.212	**.917**
Visual 2	**.888**	−.030	.135	−.174	
Visual 3	**.930**	.040	.057	−.221	
Visual 4	**.928**	.077	.079	−.163	
Visual 5	**.831**	.049	.073	−.201	
Navigation1	.017	**.802**	.327	−.146	**.919**
Navigation2	.070	**.836**	.321	−.162	
Navigation3	.081	**.843**	.312	−.136	
Navigation4	.098	**.792**	.264	−.268	
Information1	.130	.314	**.715**	−.208	**.871**
Information2	.111	.363	**.767**	−.115	
Information3	.151	.306	**.738**	−.305	
Information4	.149	.296	**.780**	−.138	
Irritation1	−.202	−.128	−.176	**.840**	**.864**
Irritation2	−.257	−.313	−.277	**.757**	
Irritation3	−.156	−.493	−.301	**.664**	

Values in bold highlight the loading of items on their intended factor and the last column indicates internal liability of each construct.

Table 2
Means, std. devs., and correlations.

	Mean	SD	1	2	3	4
1. Visual	22.78	2.60	1.00			
2. Navigation	17.23	2.52	.233[*]	1.00		
3. Information	16.46	2.46	.346[**]	.702[**]	1.00	
4. Irritation	3.97	1.59	−.404[**]	−.595[**]	−.603[**]	1.00

[**]$p < 0.01$.

Table 2 presents the descriptive statistics and results of correlation analysis among the study variables. Consistent with past research on website quality and usability, all correlation estimates among website design characteristics were positive and significant. As expected, the correlations estimates among perceived irritation and the three website design characteristics were negative and significant. To ensure that multicollinearity was not present in the data, the variance inflation factor (VIF) values were inspected and all values were below 3 and all correlation coefficients were below the threshold value of .8 (Bryman & Cramer, 1994). Thus, multicollinearity was not a concern. The correlations between perceived irritation and website design characteristics ranged from ($r = -0.404, p < 0.01$) for visual design to ($r = -0.603, p < 0.01$) for information design. These findings corroborate that the notion that poor information and navigation designs of online shopping sites had great negative effects on perceived irritation among online consumers (Lim, 2013).

Multiple regression analysis was used to assess the influence of the three website design characteristics on perceived irritation among online shoppers. The regression results are presented in Table 3. The three website design characteristics demonstrated significant and negative effect on perceived irritation. Visual design ($\beta = -0.285; p = 0.013$), navigation design ($\beta = -0.342; p = 0.002$), and information design ($\beta = -0.226; p = 0.008$) of an online shopping site demonstrated significant negative effects on perceived irritation among online shoppers. Thus, all research hypotheses (H1, H2, and H3) were supported by the data. Taken together, visual, navigation, and information website designs explained about 46.6% of the variability in perceived irritation. These results provide further support for the pivotal role that website design factors play in shaping consumers' perceptions of irritation in online shopping contexts.

5. Discussion and implications

Extending past research pertaining to consumers' irritation, this study investigated the impact of website design characteristics on perceived irritation among online consumers. Focusing on the most visible and functional website design factors, the present study hypothesized that visual, navigation, and information design characteristics of online shopping sites would have negative effects on perceived irritation among online consumers. The results provided support for all of the research hypotheses and revealed inverse relationships among website design factors and perceived irritation. The three website design characteristics explained a

Table 3
Multiple regression results.

	Perceived irritation		
	B	t	P
Visual Design	−.285	−2.523	.013
Navigation Design	−.342	−3.144	.002
Information Design	−.226	−2.736	.008
R^2	.466		
F	25.912[**]		

[**]$p < 0.01$.

sizable amount of variability in perceived irritation in online shopping. These results offer valuable implications for businesses to enhance their presence in the virtual marketplace and reduce perceptions of irritation among their online customers.

As posited in H1, visual website design demonstrated a strong negative impact on perceived irritation in online shopping. This implies that a website with an unpleasant visual design may upset its audience and bring about feelings of irritation. Accordingly, visual website design features that could increase feelings of irritation such as poor layouts, small fonts, eye glaring colors, and inappropriate graphics should be avoided (Lim & Ting, 2012). Likewise, annoying visual aids such as pop-up messages, blinking text, animated banners, and sponsored advertisements may distract consumers and lead to negative perceptions about the website (Gao et al., 2004). Since this study examined an e-commerce site that sells apparel products, it is important that apparel websites use rich and attractive visual designs to display product's attributes as clearly and precisely as possible because consumers rely heavily on the clarity of the site's visual design to judge the look, feel, and quality of products (Wells et al., 2011).

Consistent with H2, the impact of website navigation design on perceived irritation was significant and negative. It is interesting to note, though, that the impact of navigation design on perceived irritation was higher than the effects of the other two design factors. This finding is consistent with previous studies which recognized website navigation as a key factor affecting users' perceptions and evaluations of commercial websites (Zhang & von Dran, 2002). Online consumers prefer shopping at websites with intuitive and uncomplicated navigation structure that can help them complete their tasks with minimal effort (Monsuwé et al.,2004). A website with straightforward navigation evokes feelings of pleasure and gratification among users (Koo & Ju, 2010) and improves satisfaction with online shopping (Cyr, 2008), whereas websites with cumbersome or confusing navigation design are more likely to irritate customers and discourage them from shopping at or returning to the site in the future. As such, online retailers need to simplify the navigation design of their websites to allow consumers to navigate the site seamlessly and quickly. Providing multiple navigation mechanisms such as site maps, navigation bars, shortcuts and direct links, search capabilities, and one-click options can minimize the time and effort needed to navigate the site and complete purchasing tasks.

As suggested in H3, information design demonstrated a significant and negative impact on perceived irritation. However, the impact of information design on perceived irritation was slightly lower than the effects of visual and navigation designs. A plausible explanation for this unexpected finding could be the fact that participants were given sufficient information about the product that they were required to find and buy and they also were not required to make price or product comparisons. Thus, participants had to perform minimal information-related tasks at the website and, as a result, they may have felt that the information design was sufficient for their objectives. Alternatively, participants may have not fully explored or utilized the website's information design elements because they have canceled the purchasing transaction before it was fully completed. Thus, it is possible that they did not interact with website's information design long enough to realize the value and quality of the information design. Nevertheless, this study provides support for past studies which show that information design is vital for attracting more online consumers (Lee and Kozar (2006).

This study expands pervious research and shows that a website's information design has a negative impact on perceived irritation (Huang, 2008; Lim, 2013; Luo, 2002). As such, online retailers need to pay careful attention to the information design of their websites and ensure that customers are not inundated with irrelevant information that could distract and irritate current and potential customers. For example, irrelevant information, incompatible information formats, and unpleasant information delivery tools such as popup ads and continuously running animation, could distract users, increase their cognitive effort to process information and this could increase their feelings of irritation (Gao & Koufaris, 2006; Sicilia, Ruiz, & Munuera, 2005).

This study extends prior work in some important aspects. First, past research often focused on the effects of website design elements on positive consumer emotions and reactions such as enjoyment and playfulness. In contrast, this study focused on an overlooked and negative psychological factor; perceived irritation from a website design. Since very few studies, if any, explored the relationship between website design and perceived irritation (Gao & Koufaris, 2006), this study expands existing literature on the effects of website design in online shopping behavior. Second, past work has examined website design as one construct without focusing on the specific design features that may please or irritate users. More specifically, Zhang and von Dran (2002) maintain that past research has not given any insights into whether users perceive some website design features as more important than others. In comparison, this study examined three key website design characteristics and showed their varying effects on perceived irritation. This finding substantiates the view that consumers have different quality expectations for site designs when using different types of websites (Zhang & von Dran, 2002). Third, as pointed out earlier, past research has focused predominantly on the outcomes of perceived irritation and overlooked its determinants, especially in online shopping. Bagozzi (2011) suggests that the theoretical meaning of a construct can be substantially improved by understanding of not only the consequences of the construct but also its antecedents. By focusing on the determinants of perceived irritation online shopping, this study provides better insights into perceived irritation and how it is influenced by website design characteristics.

With the tense competition in the virtual marketplace and among online retailers, maintaining an attractive and efficient website is pivotal for attracting and retaining customers. A website with tedious or infective interface design can be quickly rejected and abandoned by consumers with a simple mouse click (O'Brien & Toms, 2008). In studying the impact of the shopping environment in traditional stores, Baker (1986) identified design factors in the store environment such as visual cues, layout, and color as key factors that can affect consumers' emotional states and subsequent return or avoidance intentions toward the store. Likewise, Bitner (1992) maintains that signs, symbols, and artifacts used in physical stores serve as cues and signals that communicate explicit or implicit messages to consumers. The present study revealed negative relationships among website atmospheric designs and perceived irritation. Thus, websites with effective visual, navigation, and information designs can mitigate feelings of irritation among their customers and, subsequently, enhance consumers' return to the site. d'Astous (2000) offered several specific actions that businesses can take to avoid irritating situations in their physical stores. Most of the recommend actions can be utilized in shopping websites. For instance, d'Astous (2000) suggests that consumers get irritated when they are unable to find what they need. Such annoying situations could be avoided considerably in online shopping environments by providing fast and accurate search engines, site maps, and product catalogs.

6. Limitations and future research

This study has some limitations that should be recognized when interpreting the results. First, the use of a student sample in an educational setting represents a potential limitation that may

restrict the generalizability of the results to other settings or consumer groups. Although the use of student samples is common in comparable studies (e.g. Gao & Wu, 2010; Huang, 2008; Rosen & Purinton, 2004; Wells et al., 2011) and students constitute a qualified sample to examine online shopping behavior (Gao & Koufaris, 2006; Ha & Stoel, 2008), the research hypotheses should be tested with broader and more diverse samples of online consumers.

Second, this study used aggregate measures of website design characteristics. Unquestionably, website design variables are multidimensional constructs that comprise a multitude of underlying web design features. Thus, future research should examine website design factors with greater specificity and parse website design characteristics into more detailed factors that capture specific web design attributes. Research in this direction can build on studies of website usability and human–computer interaction. For instance, Manganari et al. (2009) reviewed the literature on store atmospherics and developed a model to map physical store atmospheric attributes to virtual online stores. Similarly, Eighmey and McCord (1998) provide valuable guidelines for designing commercial website aspects such as home page, colors, loading time.

Finally, a complete online buying transaction involves multiple activities, including searching for target products/services, evaluating and selecting among available options, ordering, delivery, and final payment (Shih, 2004). Since this study utilized a partial shopping transaction that was not executed in its entirety, the effects of website design factors were not fully experienced by participants for the remaining activities in the purchasing transaction such as submitting the order, paying for the purchase, and obtaining post-order information such as confirmation and shipping details. Thus, future research should replicate this study in a field setting and use actual and complete online purchase transactions to capture the full impact of website design characteristics on perceived irritation throughout all the steps of online shopping and purchasing.

For future research, this study highlights several valuable areas for future research. First, demographic attributes such as age and gender demonstrated varying direct and moderating effects on consumer buying behavior. For instance, d'Astous (2000) found that women were more irritated than men by displeasing aspects of the shopping environment. However, it is unknown whether such findings extend to online consumers or how demographic factors influence the relationship between website design and perceived irritation. Accordingly, future research should examine effects of age and gender differences on perceived irritation in online shopping contexts. Results attained from this line of research could offer valuable implications for understanding what aspects of a site's design features is more important to its customer group and to improve website's design elements to accommodate consumers' needs and minimize their feelings of irritation.

Second, online shopping is now a universal phenomenon that transcends cultural and national boundaries and online consumers come from numerous countries and diverse cultural backgrounds. However, research aimed at understanding the influence of culture on website design is visibly lacking (Cyr, 2008). Because, websites inadvertently display various cultural markers (e.g., language, symbols, and graphics) that are easily recognized by consumers (Bartikowski & Singh, 2014), businesses need to recognize cultural differences when developing websites to target consumers from other cultural backgrounds. For instance, Ganguly et al. (2010) found that culture was a moderator of the relationship between website design and trust in online shopping. However, Cyr (2008) found mixed results across different cultures regarding the effects of website design on trust and satisfaction among online consumers. To date, no research has examined the effects of culture on the impact of website design on perceived irritation in online

shopping. Certainly, research in this area can provide better insights into developing e-commerce websites that are more congruent and accommodating to other cultures.

Finally, since this study used a commercial website, future research efforts should use other types of websites. Mithas et al. (2007) classify websites along three dimensions: domain (informational or transactional), ownership (government or commercial), and product offering (goods or services). Thus, this study can be replicated with other types of websites such as informational or government website. Similarly, product-offering sites can be divided into websites that sell search (e.g., books) or experience (e.g., clothing) products (Wells et al., 2011). Just as there are differences between what causes irritation in traditional and online and shopping environments (Zhang & von Dran, 2002), there are differences in causes of irritation at e-shopping sites that sell different products (Turley & Milliman, 2000). For instance, websites that sell "experience" products such as cosmetics or fashion are more sensitive to visual design attributes including colors and graphics; whereas websites that sell "search" products such as computers are more sensitive to information and content design such as the amount, quantity, and format of the obtainable information (Sicilia et al., 2005). Future research should investigate whether the relationship between website design characteristics and perceived irritation vary across different websites and provide insights into the design features that are more important to users in various online domains. Furthermore, future studies can explore the impact of website design characteristics other online shopping gratifications such enjoyment, social interaction, and achievement (Wu,Wang, & Tsai, 2010).

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