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Lewin's Behavior Equation to Explain the Differences in Internet Security Incidents

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Abstract

This study's purpose is to determine whether internet security behavior differs between males and females based on Environmental or Person as defined by Lewin's Field Theory of Behavior. The Environment (E) refers to the distinct roles influenced by the subject's culture and the Person (P) consists of the subject's non-changing characteristics. We found differences existed between males and females when exploring security behavior. By comparing current results with prior studies, risk taking, and invulnerability are based on the Person (non-changing characteristics). Male's behavior did not change over time with changes in technology (Environment). Hence, this may explain why males experience more security incidents than females.

Key Words: Gender, security incidents, invulnerable, computer behavior, exposure, Lewin's Theory.

1. INTRODUCTION

Historically, information technology (IT) has been considered a male-dominated field, with males holding over seventy-four percent of IT jobs (Daley, 2020). Galyani-Moghaddam (2010) extended that gap to the use of information and communication technologies. Results from other studies on peoples' characteristic differences in IT are inconsistent. A decade ago, Galyani-Moghaddam (2010) found a gap in access and IT use between males and females. However, "information and communication technology has brought many changes in society in many aspects, has shaped new scenarios and provided new challenges for human beings" (Galyani-Moghaddam, 2010, p.772). This study will use Lewin's Theory of Person and Environment to study gender differences.

Environment (culture) and the Person (non-changing characteristics) should be considered significant factors when exploring IT usage behavior (Chai et al., 2011) and security behavior. Differences exist between how people use the internet (Nemeth et al., 2013), and in some ways are even more distinct than 10 years earlier (Joiner et al., 2012). According to Nemeth et al. (2013), men are more interested in information technology (IT) than women and use the Internet with a higher participation rate, more frequently, and with a greater range of Internet use (Joiner et al., 2012; Nemeth et al., 2013). In a more recent study by Dufour et al. (2016), boys spent significantly more time on the Internet than girls.

Researchers often label people as the weakest link in securing computer systems (Ayyagari

2012; Bulgurcu, Cavusoglu, & Benbasat, 2010; Kilpatrick, Hebert, & Bartholomew, 2005; Lee, Lee, & Yoo, 2004; Mitnick, Simon, & Wozniak, 2006; Neumann, 1999; Rezgui & Marks, 2008; Sasse & Flechais, 2005; Thomas, 2004). However, these prior studies did not explore whether differences exist between people preventing security incidents, such as unauthorized access, use, disclosure, modification, or destruction of data. Nemeth et al. (2013) determined women are usually more concerned about internet security than men.

We use Lewin's Field Theory to examine whether differences in Internet security are due to Environmental or Person's non-changing characteristics. Lewin's Field Theory states that behavior is a function of the Environment and the Person (B = *f*(E,P)). For this research, environment refers to the distinct roles of individual which are often focused around cultural, social, or economic factors. Male and female roles align with these differences as they are influenced by environmental factors. In contrast, factors that influence a person's non-changing characteristics are biologically based (Moghaddam, 2010; Tseng, 2008). Person is composed of non-changing characteristics.

Vygotsky (1986) suggests gender is a cultural-based construct supporting the socio-cultural perspective of gender (Environment). The Person differences in boys' and girls' preferences for technology are not assumed. These differences are cultural (Environmental) (Enochsson, 2005), established by the distinct roles males and females play in society. They change over time, whereas specific person's characteristics are unchangeable over time (Galyani-Moghaddam, 2010; Tseng, 2008).

Chai et al. (2011) suggest that one should consider male and female differences when exploring IT use behavior. The purpose of this study is to examine the impact of culture, as the Environmental factor, and non-changing characteristics, as the Person factor, on self-reported Internet security behavior between males and females. The literature lacks any studies that distinguish between Environment and Person when exploring technology use over time. This study seeks to answer the following two research questions: 1) Are the differences in security behavior based on the Person or on the Environmental? 2) Are these differences between male and female over time decreasing, increasing, or are remaining the same?

Our hypotheses seek to determine whether differences do not exist between males and females with respect to Internet security using Lewin's Behavior Theory. We propose that Environment and Person differences do not exist between males and females (null Hypothesis) with respect to self-reported security incidents (H1), preventive measures applied to a computer system (H2), exposure time on the Internet (H3), risk taking by accessing what is believed to be an untrusted site (H4), and perception of invulnerability (H5).

2. LITERATURE REVIEW

This research will explore if modern technologies, such as the Internet of Things (all electrical appliances connected to the Internet) and social media, are changing Internet use and security behavior over the years. The technology of 2010 is vastly different from the technology of the 1990s (Galyani-Moghaddam, 2010), and these changes are significant even in 2020. Hence, gender roles or behavior change over time (UNPD, 1999) are the subject of this study. However, if behavior differences do not change over time, the conclusion is that these differences are biology-based (Person) (Galyani-Moghaddam, 2010). The literature has many studies that report male and female differences when it comes to internet usage and computer security (Anwar et al., 2017; Galyani-Moghaddam, 2010; Nosek, Banaji, & Greenwald, 2002). These will be explored in the following sections.

While young males and females are both competent computer users, they interact with technology differently (Daniel, 2005; Galyani Moghaddam, 2010). In older studies, female university students used computers for word processing, skill-building, email, schoolwork, and chat rooms, while males use technology primarily for games and entertainment (Daniel, 2005, Viadero, 1994).

Hunley et al. (2005) found that males tend to use the computer without connecting to the Internet, whereas females use the computer with Internet access for homework purposes. However, technology has changed significantly in the 15 years since the study took place. Furthermore, Internet use is more prevalent with high-speed connections and more devices being connected every day.

Others discovered differences between males and females in computer use (Chai, 2009; Larsen & Sorebo, 2005; Terzis & Economides, 2011). For example, in a study conducted 21 years ago, Van

Slyke et al. (2002) determined that males were more likely to use the Internet than females.

More recently, study results are mixed, with some finding little or no difference between males and females (Lin et al., 2019) and others finding differences, such as Mulet's study (2020), which found males use the Internet more than females. Although the influence of gender is not yet conclusive, gender is an important contextual factor. Gender does influence Internet use (Mulet, 2020) and significant differences between how females and males use the Internet exist.

Security: Exploring how gender plays a role in cybersecurity beliefs and behaviors is important (Anwar et al., 2017) since gender influences one's perceptions, attitudes, and performance (Nosek, Banaji, & Greenwald, 2002). Females demonstrate greater privacy concerns than males, whether using the computer in general (Walstrom et al., 2010) or in a social media context (Hoy & Milne, 2010), browsing the Internet (Chai, 2009; Chai et al., 2009), conducting online transactions (Garbarino & Strahilevitz, 2004), or accessing healthcare records (Laric, Pitta, & Katsanis, 2009). Males are less likely to comply with security policies than their female counterparts (Ifinedo, 2014; Laric et al., 2009), though results from another study did not find that differences existed (Vance, Siponen, & Pahnila, 2012). Finally, LaRose, Rifon, and Enbody (2008) recommended that researchers need to identify the behaviors of Internet users who encounter security incidents. Tam, Glassman, and Vandenwauver (2010) found no gender differences in password strength when individuals create passwords. Other research, however, has shown differences between males and females with invulnerability (Alberts et al., 2007; Duggan et al., 2000; Lapsley & Hill, 2010).

Phishing is another area where gender factors were explored. Researchers reported that females were more likely to fall for a phishing email until they received more training (Jagatic, Johnson, Jakobsson, & Malesczer, 2007; Sheng, Holbrook, Kumaraguru, Cranor, & Downs, 2010). While previous studies found that females were more susceptible to phishing attacks than their male counterparts (Jagatic et al., 2007; Sheng et al., 2010), more recently, Goel, Williams, & Dincelli (2017) determined females were less likely to be deceived by those messages. In another study, Rocha Flores, Holm, Svensson, and Ericsson (2014) determined that females were less susceptible to a generic phishing attack than males.

For example, females feel more vulnerable to computer security issues than males (Hoy & Milne, 2010). Adolescent males believe that they are invulnerable while their female counterparts are more cautious (Alberts et al., 2007), regardless of whether the subjects were late adolescence or early adulthood (Duggan et al., 2001; Lapsley & Hill, 2010). While invulnerability was first explored in adolescents and young adults, it was later expanded to all adults (Quadrel et al., 1993). Claar and Johnson (2012) found that individuals felt vulnerable to computer security threats regardless of gender.

Differences between males and females were significant in other studies, including attitudes toward risk (Brunner & Bennett, 1998). Gatignon and Robertson (1991) determined females take fewer risks with technology. Other studies have found that males are more likely to take risks as adolescents (Alberts et al., 2007; Duggan et al., 2001; Lapsley & Hill, 2010), but that diminishes as they grow older (Claar & Johnson, 2012). An example of risk-taking occurs when an individual still visits a site they judge as untrustworthy.

Lewin's Behavior Theory: Lewin (1936) proposed field theory suggesting that behavior (B) is a function of the person (P) and the environmental (E), as shown in the equation, $B = f(P, E)$. An increase in the magnitude of one of these driving forces can induce change (Gershwin, 1994). These factors include the person's internal characteristics (cognitive processes) and external characteristics of the environmental (culture) (Lewin, 1936; Shoda, 2003). Cognitive processes are subject to the neural structure of the Person (Hodgetts & Hausmann, 2022; Zonca, 2022; Yao et al., 2014). Thus, one must question whether these neural structures are fixed and unchanging or evolve.

The Person or the Environment may have a more substantial influence on an individual, depending upon the situation. An individual's behavior results from the function the two factors in decision-making and the importance an individual places on each factor (Lewin, 1936). Lewin's theory does not specify how the person and the environment interact to produce behavior. The comma in the equation indicates that the P and E relationship is flexible and receptive to multiple interactions between the factors (Kihlstrom, 2013). The importance of P or E will vary on a case-by-case basis. In some cases, P is the dominating factor, while in other cases, E is the dominating factor. When examining behavior, one must consider the whole situation, i.e., both P and E (Lewin, 1936).

Lewin's theory applied: Gender is a cultural construction. A socio-cultural perspective with gender occurs when changes are associated with the Environment (Vygotsky, 1986) and not with non-changing characteristics (Person) between males and females. The differences are a result of culture (Enochsson, 2005). In other words, the Person (P) focuses on unchangeable biological characteristics. Male and female roles can change over time with changes in external characteristics such as culture and technology (UNDP, 1999).

Lewin's Theory indicates behavior results are from the interaction of these two factors, Person and Environment (Lewin, 1936). This research will apply Lewin's Field Theory. Non-changing characteristics will be Lewin's construct, the Person, and culture, the Environment. Both are driving forces for behavior (Gershwin, 1994). Internet use will be the behavior. Three equations are possible when exploring behavior as the Internet usage differences between males and females.

a) Security behavior = f (E,P), where differences in behavior are based on the interaction between cultural roles, based on the Environment, and non-changing characteristics, based on the Person.

b) Security behavior = f (E), where differences in behavior can change over time due to a change in technology or culture, i.e., the Environment (E).

c) Security behavior = f (P), where differences in behavior do not change over time due to permanent characteristic of the of the Person (P).

When hypothesizing use as a function of the environment/culture, technological advances result in changes in society and scenarios and present challenges for individuals (Galyani Moghaddam, 2010). In other words, this theory posits that sociocultural issues influence an individual's access and use of IT (Galyani Moghaddam, 2010), which can change over time.

When considering use from the Person differences, males and females show different attitudes about the same objects and subjects because of differences in hormonal exposure (Mueller et al., 2008) and areas of the brain activated (Cahill, 2006). For example, differences in cursor motions (eye-hand coordination) are biologically based (Yamauchi et al., 2015), which usually does not change over time. Lewin's Theory indicates behavior results are from the interaction of these two factors (Lewin, 1936). This paper may show these two factors can function independently from each other with behavior usage as show in equation b) or equation c).

Hypothesis: This paper will explore whether security incidents, behaviors, invulnerabilities, and personal usage differences between males and females are based on the Environment or the Person. Thus, this paper will explore whether differences between males and females exist based on culture or non-changing characteristics by applying Lewin's Field Theory to ten experiences/behaviors pertaining to internet usage, behavior, and security.

We propose that differences do not exist between males and females (Null Hypothesis) with respect to:

(H1) Self-reported security incidents.
(H2) Preventive measures applied to a computer system.
(H3) Exposure time on the Internet.
(H4) Risk taking by accessing what is believed to be an untrusted site.
(H5) Perception of invulnerability.

Reviewing past literature will indicate if these differences are based on the Person, Environment, or both. If behavior does not change over time, the conclusion will be Person, Security behavior = f (P). If behavior does change over time, the conclusion will be Environment, Security behavior = f (E).

3. RESEARCH METHODOLOGY

Data Collection

We used an online survey to test the hypotheses. Qualtrics, Inc., an online survey company, provided 1,260 randomly selected subjects from their database of United States residents. An item was embedded in the survey to ensure that all respondents were reading the survey questions, which confirmed the validity of the responses. We analyzed 1,044 valid responses after omitting 39 respondents who failed to respond to the validation item, 6 for speeding through the survey, 143 for not consenting, 20 for invalid age, and 8 respondents with an age above 85. The large sample size increased the power of the statistics, which provides the opportunity to detect small significant differences.

Measure Categories
Items to measure security incidents were taken from White (2012, 2015). To measure time exposure, respondents indicated the number of hours they used their home computer to access the Internet each day and during the weekend. The items to measure protective behavior were taken from White (2012, 2015). Risk taking was measured using the number of times they visited what they perceived as an untrusted website. Survey items from Lapsley and Hill (2010) were modified to fit the present environment. For example, prior research on invulnerability studied automobile accidents instead of security breaches and the items were modified accordingly.

Demographics
The mean age was 47.64 years old (Std. Dev. = 15.9 years). The distribution was not skewed (skew .135, Std error .076). However, kurtosis indicated a flat/wide distribution (Kurtosis -1.055, Std error .151). Half of the respondents were male (49.9%). The majority of the respondents were college educated with 78% having some college or a college degree. Table 1 shows the job distribution of respondents. The large Unemployed percent can be explained as those who are unemployed, retired, students, or stay at home parents.

Computer professional/technician	6.9%
Computer security professional	1.6%
Use a computer on the job	37.8%
Do not use a computer on the job	12.4%
Unemployed	41.3%

Table 1. Demographics

Validity and Reliability Data Analysis
Validity and reliability of the data were checked using Cronbach's Alpha, Friedman's Test, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, and Bartlett's Test of Sphericity before the data was analyzed. The Cronbach's Alphas were all over .89, which indicates internal consistency. Friedman's Tests showed responses for all variables were not random ($p < .001$). These results are shown in Table 2.

For this analysis, validity was tested by performing the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Since KMO was greater than .5 (KMO = .928), and Bartlett's Test was significant (Chi-Square 38100.666, df 1081, $p < .001$), all variables had strong relationships, supporting the use of factor analysis. Although these items are self-reporting/perception, they have significantly high validity and reliability.

	Cronbach's Alpha	Friedman's Test
Security Incidents	.944	1467.989 *
Prevention	.893	1528.874 *
Invulnerable	.909	1206.089*

*p<.001

Table 2. Reliability

A factor analysis using principal component analysis (Varimax rotation with Kaiser Normalization) was performed to ensure all items of the survey loaded correctly on the intended factors. Eight survey items loaded with scores less than 0.7 and were removed from the analysis. The remaining items loaded clearly on the intended factor with loading scores greater than 0.7. The total variance explained through rotation sums of squared loadings was 68.7%. Seven factors were related to security incidents, including Preventive Behavior and Invulnerable.

4. FINDINGS

E & P Differences
To test the hypotheses, we paired non-changing characteristics with Person and culture as the Environment. Both are driving forces for behavior (Gershwin, 1994). However, this paper shows these two factors can function independently from each other with security behavior as show in the equations b) Security behavior = f (E), and c) Security behavior = f (P).

We computed a one-way analysis of variance (ANOVA) to examine differences between males and females with Internet security (reported security incidents, prevention, exposure time, accessing untrusted web sites-risk taking, invulnerability). See Table 3 titled *One-Way ANOVA of factors between males and females.*

The One-Way ANOVA indicated no differences with Prevent (H2) and Exposure Time (H3) between genders. However, it appears that males perceive invulnerability (H5) more than females, hence, will explain access untrusted sites (H4) more than females. This can lead to men having more security incidents (H1) than females.

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		Sum of Squares	df	Mean Square	F	Sig.
Internet Security						
1. Security Incidents	Between Groups	1425.841	1	1425.841	10.013	**.002**
	Within Groups	148375.847	1042	142.395		
	Total	149801.689				
2. Prevent	Between Groups	55.252	1	55.252	.905	.342
	Within Groups	63622.989	1042	61.059		
	Total	63678.241	1043			
3. Expose Time	Between Groups	2.117	1	2.117	.776	.378
	Within Groups	2840.868	1042	2.726		
	Total	2842.985	1043			
4. Untrusted sites	Between Groups	42.102	1	42.102	13.184	**.001**
	Within Groups	3327.518	1042	3.193		
	Total	3369.620	1043			
5. Invulnerability	Between Groups	1000.152	1	1000.152	22.141	**.001**
	Within Groups	47069.089	1042	45.172		
	Total	48069.241	1043			

Table 3. One-Way ANOVA of factors between males and females

The Effect Size was as measured by Cohen's d. The d values were found to be small to medium (d = .157 to .215). However, the results were significant, with p < .01 to .001. A larger sample size can show greater practicality of the results.

5. DISCUSSION

Male and female differences were observed in the late 1990s (Sherman et al., 2000), through the early 2000s (Galyani Moghaddam, 2010). Today's technology (i.e., social media, streaming, smartphones, wearables, and the Internet of things) evolved dramatically both in use and availability from the technology used in the 1990s and early 2000s. The Internet is easier to use and more enjoyable than before (Celik & Ipcioglu, 2007; Chai, 2009). Although a few previous researchers suggested that the male and female gap in computer use was closing, the current study found that the gap still existed for certain activities.

Internet Security

This study is consistent with past studies that reported differences between males and females with security incidents (Goel et al., 2017; Jagatic et al., 2007; Sheng et al., 2010). As predicted in Hypothesis 6, males reported experiencing more security incidents, which has been supported even with changes in technology over the past thirteen years. Perhaps, males are more aware of security breaches or males could actually experience more breaches due to their feeling of invulnerability and visiting more untrusted websites. Jianakoplos and Bernasek (2008) determined that females are more risk averse than males, suggesting that security incidents are based on the Person.

One explanation for security incident outcomes may lie in preventive behaviors and time spent on the computer (exposure). In this study, preventive behaviors were similar between males and females and thus the Null Hypothesis was accepted for Hypothesis 2. White (2015) determined that regardless of whether users installed security safeguards, both males and females still reported experiencing significant numbers of security incidents. Since the literature lacks any male/female preventive studies, it is unknown if there were differences in the past. We ventured that both males and females value security equally. Since behaviors are similar, we speculate preventive behavior is a function of the interaction between both Environment and Person with varying degrees across the population; Security *behavior of prevention = ƒ* (E,P).

Akman and Mishra (2010) and Tzantzara and Economides (2010) determined that males spend more time online than females. However, the current study found no male-female differences and thus Hypothesis 3 is not supported. In fact, we observed that both males and females spend

the same amount of time connected to the Internet and use the Internet similarly, whether to read emails, search for information, or shop. Most of these results are consistent with Jackson et al. (2001, p. 374), who determined that "males and females used the Internet equally." Since the previous studies, new applications, including online bill pay, shopping, banking, streaming, and social media, have changed the IT landscape. The devices we use to access these services are more sophisticated. These changes appeal to both males and females, due to environment (technological) changes. Hence, the previously observed differences are based on Environment, therefore suggesting the gap no longer exists.

Exposure to the Internet over time is a key concept in risk analysis. The more time individuals spend on the Internet, the more likely they will experience a security breach (Furnell et al., 2007). These individuals have a larger attack surface since they are exposing themselves to the Internet more than others. Akman and Mishra (2010) and Tzantzara and Economides (2010) determined that males spend more time online than females. Our study contradicts Akman and Mishra (2010) and Tzantzara and Economides (2010) as our study found no differences for time either group spent on the Internet. In other words, ten years after these prior studies, technology and web usage has evolved from simple transactions, such as purchasing merchandise online, to more advanced tasks, such as bill pay, banking, using smartphones, streaming music and video, and participating in social media. This behavior changed since the processes are more complex, more convenient, and subsequently appeal to both males and females. Because usage transformed over the past ten years, the authors purport that this change is due to Environment (technological) changes, hence, attributed to cultural differences and not a Person difference. Therefore, security behavior = f(E), is applied. Differences in behavior can change over time due to a change in technology or culture Environment (E).

This research determined that males were more likely to visit untrusted websites as tested in Hypothesis 4. Males also felt less vulnerable (or more invulnerable) than their female counterparts as determined in Hypothesis 5. Thus, males would be more likely to experience security breaches.

In examining Hypothesis 4, this study is consistent with these prior studies as males and females differ significantly in terms of risk attitude toward technology (Brunner & Bennett, 1998; Moghaddam, 2010) over time. Males are greater risk-takers. Even with changes in technologies over the past twenty years, this difference persists. Therefore, security behavior of *risk taking* = $f(P)$ is applied. Differences in behavior do not change over time due to permanent characteristics of the Person. Neural structures involving risk taking appear to be fixed and different between males and females.

One explanation for males experiencing more security incidents (H1) was that they felt less vulnerable (more invulnerable) (H5) than females. This could also explain why they visited more untrusted websites (H4). Females, who feel more vulnerable using computers, report fewer security incidents in the current study as they reported taking fewer risks and visiting fewer untrusted websites. This research is also consistent with other prior research in that more males reported taking more risks by visiting untrusted sites more often than females did and thus indicating they felt more invulnerability (Alberts et al., 2007; Duggan et al., 2000; Lapsley & Hill, 2010). Due to the consistency between the prior research from ten years ago and the current study, males continue to feel less vulnerable than females. Thus, these findings support a Person difference rather than a culture difference. Therefore, security behavior of risk taking = f (P) is applied when examining invulnerability. Differences in behavior do not change over time due to permanent characteristic of the Person. Neural structures involving risk taking appear to be fixed and different between males and females.

These results contradict the results by Anwar et al. (2017) and Claar and Johnson (2012), who found no differences in computer vulnerability between males and females. While females may feel just as vulnerable as males, they still report experiencing fewer security incidents and take fewer risks with untrusted sites. By taking fewer risks with untrusted sites, females feel more vulnerable, which suggests differences are based on the Person.

6. CONCLUSION

Enochsson (2005) predicted there will be male and female equality on the Internet. Female users have more chances and opportunities to experience the Internet (Ono & Zavodny, 2003). We found that while females are spending as much time on the Internet as their male counterparts, the way they access/use the Internet differ. As new technologies are introduced, practical use differences between

males and females lessen, as suggested by this study. The maturing use of games is unique. This may be due to a combination of Environment and Person aspects of age. Further research with maturing use, like gaming, is needed.

Changing Conditions

When evaluating research on males' and females' Internet usage, three intervening variables/factors should be considered: 1) changing technology, 2) changing usage over time, and 3) different society/culture. The technology and usage of the Internet in 2022 are vastly different from 2001. Changes in male and female usage differences may also be influenced by society's changing attitude towards technology and the Internet.

The current results indicate the current differences between males and females exist with security incidents, risk taking, and invulnerability. There were no differences with preventive behavior and exposure time. By comparing with prior studies, risk taking, and invulnerability is based on the Person permanent characteristics. Males' behavior did not change over time with technological advances. Hence, this may explain why males experience higher security incidents. Exposure is based on Environment since it changed over time. These observations lay the foundation for further study on how Environment and non-changing Person characteristics impact on Internet usage and security.

Implications for organizations

The differences noted here should be studied further to create effective security training programs (Anwar et al., 2017; Ifinedo, 2014) and identify ways to combat security breaches due to employees' behavior. Environment and Person differences should be considered during the development, validation, and implementation of Internet sites (Akman & Mishra, 2010; Celik & Ipcioglu, 2007) as well as security training programs (Anwar et al., 2017; Ifinedo, 2014). For example, IT managers must be aware of preferences based on culture (Environment) or other demographic preferences (Person) (Chai et al., 2011). IT managers must be aware of males' tendency to access untrusted websites.

These differences should be explored further to better understand the effect of Environment and Person characteristics on computer security at home and at work, as well as to identify ways to combat security breaches. Behavioral differences between males and females need to be considered during the development, validation, implantation of e-commerce practices, and distance education alternatives (Celik & Ipcioglu, 2007). For example, more training and education for males on avoiding risk. Security is a major issue regardless of whether an individual is on the organization's networks or using their home computers.

7. FUTURE RESEARCH

Future research should include nonbinary sex, age, education, and cultural differences. Researchers should also investigate how the Internet of things and other ubiquitous technologies impact use. Additional demographic variables, including age, education, changes in technology, and cultural differences, should be included in future research to provide a clearer understanding of these differences.

Do these variables differentiate differences based on Environment and Person? Do these differences decrease with age, changes in technology, and/or changes in culture, especially when it comes to games, a maturing use? What differences in Internet use and behavior do not change over time? Are such differences that do not change due to permanent characteristics of the Person?

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