International Journal of
IJCHP
Clinical and Health Psychology

Consumer attitudes regarding internet health information and communication: Gender, locus of control, and stress implications[1]

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ABSTRACT. College students frequently use the internet for health communication. We conducted a descriptive study through a survey of 227 college students to determine if there were differences between those who used and did not use the internet/e-mail for health topics. Dependent variables were the Perceived Stress Scale and the Multidimensional Health Locus of Control (MHLC) subscales. Independent variables included questions about internet health information use and internet/e-mail communication. The analyses were conducted for the overall sample and also separately by gender. For all three communication items, internet/e-mail users had significantly higher perceived stress. No differences existed for internet health information. These results were maintained in analyses for men but only approached significance for women. For internet health information, internet users had significantly higher internal locus of control subscale scores. These results were maintained in analyses for men while for women the powerful others subscale was now significant. Men and not women with perceived stress are communicating by e-mail or through the internet about health topics. Also, with regard to internet health information use, men use an internal locus of control while women use a powerful others locus of control. These findings can be useful for those counseling college students with health problems.

KEYWORDS: internet. Communication. Stress. Internal-external control. Descriptive study through survey.

RESUMEN. Los estudiantes universitarios utilizan internet para comunicarse y obtener información sobre salud. Se realizó un estudio descriptivo mediante una encuesta a 227 estudiantes para determinar si había diferencias entre aquellos que utilizan internet y el correo electrónico para informarse sobre salud y aquellos que no. Las variables dependientes fueron la Escala de Estrés Percibido y las subescalas de la Escala Multidimensional de Locus de Control de la Salud. Las variables independientes incluyeron preguntas sobre la utilización de internet para informarse o comunicarse con otros sobre salud. Se realizaron análisis para el total de la muestra y por género. En los tres ítems de comunicación, los que utilizaban internet/correo electrónico mostraron un nivel de estrés percibido significativamente más alto. No hubo diferencias entre los que usaban internet para buscar información sobre salud. Estos resultados se mantuvieron para hombres y se acercaron a la significación para las mujeres. Los que utilizan internet para obtener información sobre salud puntuaron significativamente más alto en la subescala de locus de control interno. Estos resultados se mantuvieron en los varones, mientras que para las mujeres fue significativa la subescala de control por otros poderes. Los hombres con estrés percibido se comunican por correo electrónico o internet sobre salud, mientras que las mujeres no. Respecto al uso de información sobre salud en internet, los hombres utilizan un locus de control interno y las mujeres un locus de control por otros poderes. Estos resultados son útiles para los profesionales que asesoren a universitarios con problemas de salud.

PALABRAS CLAVE. Internet. Comunicación. Estrés. Control interno-externo. Estudio descriptivo mediante encuesta.

The internet allows one to obtain a large amount of health information. One study reports that almost 99% of college students use the internet, 73% research for health information online, and 27% would like to participate in an online health program (Escoffrey *et al.*, 2005). Another study reports that 66% of individuals ages 18-29 search online for health information (Hanauer, Dibble, Fortin, and Col, 2004). Also, 90% of people would be interested in communicating with their doctor by e-mail (Car and Sheikh, 2004). As college students are frequent internet users, it would be useful to understand the relationship of their internet health information use with regard to key psychological constructs of stress and locus of control. An improved understanding of these relationships may help providers and institutions improve their use of the internet to serve this population's health information needs.

Individuals look online for many reasons. Stress is one area studied with regard with internet information use. Among East Asian international students using the internet, the acculturative stress factor of increased perceived discrimination was associated with greater relaxation with increased internet information use (Ye, 2005). On the other hand with regard to health topics, two studies among women with breast cancer reported no association of perceived stress with internet use for health information (Fogel, Albert, Schnabel, Ditkoff, and Neugut, 2002; Fogel, Albert, Schnabel, Ditkoff, and Neugut, 2003). However, using the internet for online support groups is associated with reduced

perceived stress, as shown in a study of individuals with cancer (Wright, 2002). There appears not to be any research on the association of internet health information use and perceived stress among college students.

Multidimensional health locus of control (MHLC) is a psychological construct that relates to one's perceptions of control over one's health. With regard to internet use and MHLC, elderly women who used the internet to locate health information had an internal health locus of control (Campbell, 2004). In another study where both elderly men and women were taught to access internet health information, internal or powerful others health locus of control were not significant while chance health locus of control was significant (Campbell and Nolfi, 2005). One review reports that MHLC is a useful construct for studying numerous health behaviors of college students (Steptoe and Wardle, 2001). Also, in a sample of young adults that included college students, the chance subscale of non-health related locus of control was related to increased e-mail use and the internal subscale to increased internet information searches (Chak and Leung, 2004). There appears not to be any studies among college students searching for internet health information and MHLC.

There are differences and similarities with regard to internet use among men and women. Women search more than men for health or medical information over the internet (Rice, 2005). However for other topics there are relatively few differences. Men and women have similar search behavior with regard to searching for internet information regarding health care decision making (Snipes, Ingram, and Jiag, 2005). Also, another study reported that men and women visited similar websites, search engines, websites related to school, new websites, and shopping websites. However, some differences were noted in that men had greater preferences for websites with videos and sounds. Also, men visited websites containing humor, gaming, and sports, while women visited web sites such as online journals (Mitra, Willyard, Platt, and Parsons, 2005).

One nationally representative study in the United States reported that the most common use of the internet was with regard to advice about health or health care (Baker, Wagner, Singer, and Bundorf, 2003). The second most common use was e-mailing a friend or family member about health. E-mailing a doctor or someone with similar health conditions were the least common uses of the internet for health information (Baker *et al.*, 2003). In addition, e-mail use can be less intimidating than a face-to-face consultation (Car and Sheikh, 2004). With regard to internet communication patterns, there appears to be different opinions regarding gender differences. For example, one study reported a greater preference for e-mail communication among women than men (Boneva, Kraut, and Frohlich, 2001). However, another study reported no differences between women and men with regard to internet communication and relationship preferences (Thayer and Ray, 2006).

It appears that only two studies discuss the internet and health topics used among college students (Escoffrey *et al.*, 2005; Hanauer *et al.*, 2004). Also, there appears to be limited if any research on college students' use of the internet and how it relates to perceived stress or MHLC. This group consists of those who are very active internet users and it is important to understand the psychological and health behaviors of this group. To our knowledge, based upon the literature reviewed above, we believe that we are the first to study whether a number of internet health information seeking or

communication patterns for health topics are associated with perceived stress or MHLC among college students. We conduct a descriptive study through a survey (Montero and León, 2007; Ramos-Álvarez, Moreno-Fernandez, Valdés-Conroy, and Catena, 2008). Our objectives include to analyze four different internet health information and health communication items as independent variables with regard to the dependent variables of the Perceived Stress Scale and the three MHLC subscales. We also conduct additional analyses adjusting for relevant demographic and health variables. We also determine if any of these results for perceived stress or MHLC differ between men and women by repeating all these analyses separately for men and women.

Method

Participants

Participants attended a 4-year undergraduate urban public college. This is a commuter school where students all live off campus, many with their families. The college had a total of 16,087 students enrolled in Fall 2007 (12,495 undergraduates and 3,592 graduates). The ethnic composition included: White (45.84%), Black (29.5%), Hispanic (11.54%), Asian/Pacific Islanders (12.99%), and American Indian/Alaskan Native (-.13%) (Brooklyn College, 2008).

Instruments

– Demographic variables included age, gender, and race/ethnicity. Perceived health status was inquired using the question from the Behavioral Risk Factor Surveillance System (BRFSS) questionnaire of, «Would you say that in general your health is … ?» with choices of *Excellent*, *Very good*, *Good*, *Fair*, and *Poor* (Centers for Disease Control and Prevention, 2005).

– internet Information and Communication Items. This consisted of four items and were the exact items used in a nationally representative internet health study (Baker *et al*., 2003). These items were: In the past year, about how often did you: 1) Look on the internet for information or advice about health or health care? 2) Use e-mail or the internet to communicate with a doctor or other health care provider? 3) Use e-mail or the internet to communicate with a family member or friend about health or health care? 4) Use e-mail or the internet to communicate with other people who have health conditions or concerns like yours? Items were categorized into dichotomous responses of either *Ever* or *Never*.

– Perceived Stress Scale (Cohen, Kamarck, and Mermelstein, 1983). The perceived stress scale consists of 4 items which are coded from *Never* = 0 to *Very often* = 4. Two of these items are reverse coded for total scale scoring purposes. Increased scores are indicative of higher perceived stress. This is a reliable and valid scale with Cronbach alpha reliability reported at .72 (Cohen *et al*., 1983) and has also been validated for use in a national United States sample (Cohen and Williamson, 1988).

– Multidimensional Health Locus of Control (MHLC) Scale (K.A. Wallston, B.S. Wallston, and DeVellis, 1978). The MHLC consists of 18 items that are divided into three subscales of internal, chance, and powerful others. One with an

internal MHLC believes that one's actions control one's health status. One with a chance MHLC believes that chance determines one's health. One with a powerful others MHLC believes that health is something one has no control over (K.A. Wallston *et al.*, 1978). Items are coded from *Strongly disagree* = 1 to *Strongly agree* = 6. Each subscale contains six items. Increased scores are indicative of higher health locus of control. This is a reliable and valid scale with Cronbach alpha reliability in college student samples reported of .66 to .80 for internal, .68 to .83 for chance, and .73 to .75 for powerful others (K.A. Wallston and B.S. Wallston, 1981) and has been used with many different populations including college students (Steptoe and Wardle, 2001).

Procedure

A convenience sampling method was used and all surveys were collected anonymously. Surveys were administered either in classrooms or other public places of the college. Of the 247 questionnaires distributed, 227 were completed and returned, for a response rate of 91.9%. The obtained sample is very representative of the college as for ethnicity we obtained 106 Whites (46.70%), 50 Blacks (22.03%), 21 Hispanics (9.25%), 33 Asian/Pacific Islanders 14.54% [16 South Asians (7.05%), 17 Asians (7.49%)], 16 Other (7.05%), and 1 missing response (-.44%). These percentages are very similar to the percentages reported above for the whole college. Data were collected in March 2006. The survey was exempt from Institutional Review Board review and was conducted consistent with the ethical standards of the Declaration of Helsinski. Informed consent was provided.

Statistical analysis

Descriptive statistics were used for the demographic variables. Separate analysis of variance (ANOVA) were conducted for each of the four internet information or communication items (independent variables) with either the Perceived Stress Scale or the three MHLC subscales (dependent variables). These analyses were then repeated with analysis of covariance (ANCOVA) adjusting for age, gender, race/ethnicity, and perceived health status. Also, these above ANOVA and ANCOVA analyses were repeated separately for men and women, with gender not being adjusted for in these ANCOVA analyses. SPSS Version 11.5 was used for all analyses.

Results

Mean age was 22.42 years (*SD* = 5.57). Gender included 120 men (52.86%), 106 women (46.69%), and 1 missing gender information (-.45%). Perceived health status included 30 excellent (13.22%), 71 very good (31.27%), 84 good (37.00%), 28 fair (12.33%), 12 poor (5.29%), and 2 missing health information (-.88%).

Table 1 shows significant associations of perceived stress with the three internet communication items regarding communicating with a doctor/health-care provider, family/ friend, or others with similar health conditions in both the ANOVA and ANCOVA analyses. Those who used e-mail or the internet had significantly greater perceived stress scores than those who did not. However, the item about looking on the internet for health information or advice was not significant.

TABLE 1. Perceived stress scores in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about health	(n = 72)	(n = 155)		
or health care?	7.28 (3.18)	7.51 (2.65)	.57	.10
Use e-mail or the Internet to communicate with a doctor or	(n = 191)	(n = 36)		
other health care provider?	7.19 (2.86)	8.75 (2.25)	.002	.008
Use e-mail or the Internet to communicate with a family	(n = 134)	(n = 93)		
member or friend about health or health care?	6.89 (2.96)	8.23 (2.41)	< .001	.001
Use e-mail or the Internet to communicate with other people	(n = 162)	(n = 64)		
who have health conditions or concerns like yours?	6.93 (2.87)	8.72 (2.29)	< .001	< .001

Note. Sample size varies due to respondent omissions. Covariates are age, gender, race/ethnicity, and perceived health status.

Table 2 shows a significant association of higher scores on the internal MHLC subscale for those looking on the internet for health information. With regard to the three internet communication items, there was an overall pattern of an association of either significance or approaching significance. There were higher scores for those who used e-mail or the internet for communication than those who did not on the chance MHLC subscale for both the ANOVA and ANCOVA models.

TABLE 2. Multidimensional Health Locus of Control subscale scores in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about health				
or health care?	(n = 72)	(n = 155)		
Internal	22.11 (5.64)	24.16 (5.12)	.01	.01
Chance	16.98 (4.96)	16.43 (4.58)	.41	.61
Powerful others	17.58 (5.07)	18.63 (4.63)	.12	.31
Use e-mail or the Internet to communicate with a doctor or				
other health care provider?	(n = 191)	(n = 36)		
Internal	23.42 (5.48)	24.00 (4.74)	.55	.51
Chance	16.31 (4.57)	18.14 (5.13)	.03	.06
Powerful others	18.11 (4.74)	19.25 (5.02)	.20	.30
Use e-mail or the Internet to communicate with a family				
member or friend about health or health care?	(n = 134)	(n = 93)		
Internal	23.28 (5.50)	23.84 (5.18)	.44	.38
Chance	16.14 (4.62)	17.26 (4.76)	.08	.08
Powerful others	17.83 (4.67)	18.97 (4.90)	.08	.27
Use e-mail or the Internet to communicate with other people				
who have health conditions or concerns like yours?	(n = 162)	(n = 64)		
Internal	23.56 (5.19)	23.36 (5.87)	.80	.77
Chance	16.21 (4.63)	17.56 (4.81)	.05	.13
Powerful others	17.94 (4.52)	19.14 (5.36)	.09	.18

Note. Sample size varies due to respondent omissions. Covariates are age, gender, race/ethnicity, and perceived health status.

Tables 3 and 4 show analyses stratified for men. In Table 3, similar results for perceived stress were observed in the overall sample where the three internet communication items were significant and the item about looking on the internet for health information or advice was not significant. In Table 4, the internal MHLC subscale was still significantly associated with looking on the internet for health information. However, the pattern for chance MHLC no longer occurred; not even one internet communication item was significant or approached significance.

TABLE 3. Perceived stress scores among men in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about health	(*n* = 49)	(*n* = 71)		
or health care?	7.37 (3.30)	8.03 (2.91)	.25	.10
Use e-mail or the Internet to communicate with a doctor or	(*n* = 101)	(*n* = 19)		
other health care provider?	7.43 (3.09)	9.53 (2.37)	.006	.03
Use e-mail or the Internet to communicate with a family	(*n* = 80)	(*n* = 40)		
member or friend about health or health care?	7.20 (3.14)	8.88 (2.65)	.005	.01
Use e-mail or the Internet to communicate with other people	(*n* = 90)	(*n* = 30)		

Note. Sample size varies due to respondent omissions. Covariates are age, race/ethnicity, and perceived health status.

TABLE 4. Multidimensional Health Locus of Control subscale scores among men in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANCOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about				
health or health care?	(*n* = 49)	(*n* = 71)		
Internal	22.39 (4.86)	24.32 (4.86)	.04	.04
Chance	17.44 (4.92)	16.51 (4.54)	.29	.23
Powerful others	18.01 (5.08)	17.76 (4.22)	.77	.40
Use e-mail or the Internet to communicate with a doctor or				
other health care provider?	(*n* = 101)	(*n* = 19)		
Internal	23.55 (5.36)	23.47 (4.05)	.96	.99
Chance	16.61 (4.58)	18.37 (5.15)	.13	.28
Powerful others	17.70 (4.48)	18.73 (5.10)	.37	.59
Use e-mail or the Internet to communicate with a family				
member or friend about health or health care?	(*n* = 80)	(*n* = 40)		
Internal	23.28 (5.23)	24.05 (5.01)	.44	.51
Chance	16.59 (4.68)	17.48 (4.74)	.33	.59
Powerful others	17.83 (4.69)	17.92 (4.39)	.92	.72
Use e-mail or the Internet to communicate with other				
people who have health conditions or concerns like yours?	(*n* = 90)	(*n* = 30)		
Internal	23.55 (5.09)	23.50 (5.41)	.97	.80
Chance	16.57 (4.69)	17.85 (4.67)	.20	.70
Powerful others	17.53 (4.59)	18.86 (4.44)	.18	.47

Note. Sample size varies due to respondent omissions. Covariates are age, race/ethnicity, and perceived health status.

Tables 5 and 6 show analyses stratified for women. In Table 5 showing the analyses for perceived stress, similar non-significant results were observed for the overall sample and for the men with regard to the item about looking on the internet for health information or advice. However, unlike the overall sample and the men, the communication item for doctor/health-care provider was not significant and the other two communication items for family/friends and others with similar health conditions were significant in the ANOVA analyses but only approached significance in the ANCOVA analyses. In Table 6, unlike the overall sample and the men, internal MHLC was no longer significant while now powerful others MHLC was significant. Also, similar to the overall sample but unlike men, chance MHLC was significant for the communication item for family/friend. Also, powerful others approached significance in ANOVA for this communication item.

TABLE 5. Perceived stress scores among women in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about	(*n* = 22)	(*n* = 84)		
health or health care?	6.86 (2.83)	7.07 (2.33)	.72	.92
Use e-mail or the Internet to communicate with a doctor or	(*n* = 89)	(*n* = 17)		
other health care provider?	6.87 (2.51)	7.88 (1.80)	.11	.20
Use e-mail or the Internet to communicate with a family	(*n* = 53)	(*n* = 53)		
member or friend about health or health care?	6.32 (2.54)	7.74 (2.11)	.002	.06
Use e-mail or the Internet to communicate with other	(*n* = 71)	(*n* = 34)		
people who have health conditions or concerns like yours?	6.56 (2.47)	8.00 (2.12)	.004	.06

Note. Sample size varies due to respondent omissions. Covariates are age, race/ethnicity, and perceived health status.

TABLE 6. Multidimensional Health Locus of Control subscale scores among women in comparison to internet use and communication for health topics.

Item	No M (SD)	Yes M (SD)	ANOVA p-value	ANCOVA p-value
In the past year, did you:				
Look on the Internet for information or advice about health				
or health care?	(*n* = 22)	(*n* = 84)		
Internal	21.77 (6.27)	24.02 (5.35)	.09	.08
Chance	15.85 (5.09)	16.36 (4.64)	.66	.61
Powerful others	16.86 (5.06)	19.37 (4.84)	.04	.04
Use e-mail or the Internet to communicate with a doctor or				
other health care provider?	(*n* = 89)	(*n* = 17)		
Internal	23.36 (5.63)	24.59 (5.48)	.41	.26
Chance	15.94 (4.58)	17.88 (5.24)	.12	.21
Powerful others	18.66 (4.98)	19.82 (5.02)	.38	.25
Use e-mail or the Internet to communicate with a family				
member or friend about health or health care?	(*n* = 53)	(*n* = 53)		
Internal	23.43 (5.89)	23.68 (5.34)	.82	.49
Chance	15.40 (4.50)	17.09 (4.81)	.07	.04
Powerful others	17.94 (4.66)	19.76 (5.15)	.06	.11
Use e-mail or the Internet to communicate with other				
people who have health conditions or concerns like yours?	(*n* = 71)	(*n* = 34)		
Internal	23.69 (5.30)	23.23 (6.32)	.70	.81
Chance	15.72 (4.56)	17.30 (5.00)	.11	.15
Powerful others	18.55 (4.37)	19.38 (6.12)	.43	.50

Note. Sample size varies due to respondent omissions. Covariates are age, race/ethnicity, and perceived health status.

Discussion

In this study, perceived stress was associated with a number of internet communication items for health topics among male college students, while for female college students there was no such pattern. In addition, male college students had an internal locus of control for looking on the internet for health information, while female college students on the other hand had a powerful others locus of control. Also, female college students had a chance locus of control for the internet health communication items for family/ friend.

These results for perceived stress seem counter intuitive. Chatting online among college students was found to be associated with greater perceived prolonged stress for women while no association was found for men (Thomée, Eklöf, Gustafsson, Nilsson, and Hagberg, 2007). Also, typically women and not men are seeking emotional support from their often larger support network (Landman-Peeters *et al.*, 2005). Also, in a sample of first-year college students, there was a suggestion that during stressful periods women sent a greater number of e-mail messages to their parents than men (Trice, 2002). However, this is quite consistent with a study reporting that although women may communicate a lot with e-mail, they do not share or discuss deep emotional content in e-mail communication and prefer the telephone for this deep emotional content (Boneva *et al.*, 2001). Also, research among college students shows that men and not women prefer e-mail use when they cannot meet someone face-to-face and also that men prefer to use emoticons in their e-mail at greater rates than women (Punyanunt-Carter and Hemby, 2006). Our results of an association of perceived stress for male college students and not for female college students for using e-mail and the internet for health topics similarly suggests a gender difference for preferred style of communication. With regard to health topics, male college students may prefer e-mail or other internet styles of communication which are not face-to-face. On the other hand, female college students may prefer face-to-face communication with regard to health topics.

We found that male college students had an internal locus of control for looking on the internet for health information. Men are reported to have higher internal levels of locus of control than women (Rubinstein, 2004). Also, female college students did not have this internal locus of control pattern and instead had a powerful others health locus of control. Also, female college students had an association with chance health locus of control for communicating with the internet. These results for female college students are similar to other health topics. For example, women experiencing acquaintance rape report high levels of powerful others and chance health locus of control (McEwan, Man, and Simpson-Housley, 2005).

There are a number of study limitations. First, this is not a nationally representative sample and it only consists of students from one university. Moreover, the sample was one of convenience, which can limit the ability to generalize to other college samples. Second, the questions were based on broad health topics and there may be different gender patterns with each specific health topic (*e.g.*, depression, diabetes, sexual health). Future studies on health seeking behaviors of college students should consider separate

analyses with samples of sufficient sample size to understand if there are disease-specific patterns. Third, we did not formally measure preferences for face-to-face versus e-mail/internet communication, so more research is necessary to substantiate our suggestion of a preference for male and not female college students to use e-mail and the internet for health communication about stressful topics. Fourth, we did not formally assess levels of general healthcare knowledge on a number of health topics and this may be a critical factor related to internet health communication. Fifth, perceived stress levels may be influenced by number of hours students work while taking classes and whether students are taking a full or part-time course load; we did not measure these variables.

In conclusion, there appears to be different communication patterns in the use of the internet for communication for health topics between male and female college students. Male college students appear to use the internet to communicate when faced with stress while female college students most likely use other venues of communicating and coping with stress. Also, male college students have an internal health locus of control associated with looking on the internet for health information. This pattern does not exist for female college students who instead have a powerful others health locus of control. Also, female college students have a chance health locus of control associated with communicating with family/friends about health topics.

College health care professionals, counselors, administrators, and academics may consider these findings useful with how they treat and counsel those with health problems. E-mail, with the appropriate security encryption for protecting privacy, may be a preferred venue for discussing and counseling stressful health concerns for male college students. On the other hand, e-mail does not appear to be a preferred venue for female college students and face-to-face outreach and interventions should be the primary method for helping female college students. Also, a college may find it useful to place an e-mail link and/or a place to submit questions on their health clinic website. This may be of interest to male college students who would find this style of communication useful. Similarly, creating a college website with accurate health information can be useful for male college students who with their internal health locus of control may use it as a primary resource when faced with health concerns. Also, if a college wants to create web-based interventions for students, they can consider including the MHLC on a website. Based upon the score profile, students (whether male or female) can then receive an intervention that is tailored to and consistent with their health locus of control.

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