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Gender Differences in Stress Levels and Coping Strategies in South Korea While Using Mobile Phones

This article examines gender differences in stress levels and coping strategies while using mobile phones. We constructed an e-mail survey to collect data from 1,000 adults in South Korea, and used latent means comparison and multi-group structural regression in structural equation modeling. It was determined that as compared to men, women were more vulnerable to stress. Regarding coping, women used all three coping strategies more equally than men, including active coping, expressive support seeking, and avoidance, whereas men mainly chose active coping; however, there were no significant gender differences in coping outcomes, and both women and men coped effectively by choosing their own personal strategies. We suggested how to reduce stress levels for women through enhancing their self-efficacy, as self-efficacy was shown to reduce stress levels specifically for women. Additionally, based on our findings, we proposed how both men and women could cope more effectively.

Mobile phones have become the most influential media in the digital age, and stress resulting from using such phones has become a serious social problem. For example, dependence on mobile phones or electric waves can negatively affect consumers' daily lives and health. Although recent researches have suggested that digital technology has changed from business media to social media and that the boundaries between women and men in the use of mobile phones have collapsed (Ling, 2004; Lu & Liu, 2011; Özcan & Kocak, 2003), it showed that women feel more stress while using technologies than men (Kim & Yeo, 2007; Mick & Fournier, 1998). In addition, the question remains whether or not women cope as effectively as men do with the stress of using mobile phones. If women are not able to cope effectively with the stress of using mobile phones, they are also excluded from the benefits of using mobile phones, regardless of their ability to use such phones, which is why research is needed to answer the question of how women cope, and what the coping outcomes will be.

The analysis of gender differences, regarding stress and coping skills that result from using mobile phones is important in terms of tracing the change in gender roles in the digital age. Thus, this study examines gender differences in (a) stress levels and coping behaviors while using mobile phones and (b) the relationships among stress levels, self-efficacy, coping behaviors, and coping outcomes. In order to compare the relationships, we developed a structural model based on the theories of coping and stress found in consumer behavior and psychology literature (Duhachek & Oakley, 2007; Mick & Fournier, 1998). And this study used the following approach: Latent Means Comparison (LMC) and Multi-group Structural Regression (MSR) in Structural Equation Modeling (SEM) to test the gender differences.

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This study hypothesizes that stress levels influence coping behaviors and that self-efficacy influences stress levels and coping choices. Based on prior findings, coping behaviors depend on the differential vulnerabilities of stress and individual characteristics, such as gender and self-efficacy (Moshis, 2007; Thoits, 1995). Duhachek and Iacobucci (2005) asserted that stress levels are positively related to active coping and expressive support seeking in individuals with high self-efficacy. Moreover, self-efficacy, which is individuals' strong resources, tends to reduce stress levels (Rosen, 2001). Thus, this study expects that there are significant gender differences in both stress levels and self-efficacy, and these differences affect the choices of coping. Next, we hypothesize that coping behaviors are predictors of coping outcomes. Previous researchers found that successful coping choices positively influence user satisfaction (Andresen, 1984; Moshis, 2007) and stress reduction (Duhachek, 2005). Additionally, we predict that gender differences in the choice of coping strategies lead to different coping outcomes. In summary, in order to understand stress and coping process while using mobile phones, and to test gender differences, we address the following two research questions: (a) Do gender differences exist in stress levels and coping behaviors while using mobile phones? (b) Do gender differences exist in the relationships among stress levels, self-efficacy, coping behaviors, and coping outcomes?

It is important to analyze the stress of using mobile phones because they have changed our lives and most people have such phones. However, there is the concern that women may lack the ability to use mobile phones when under the stress of using them. In order to gain real benefit from mobile phones in the digital age, women should have their own effective ways to cope with stress from using them. Therefore, it is significant to understand how women cope and whether their coping behaviors are effective when compared to the coping behaviors of men.

LITERATURE REVIEW

Coping and Stress Theories

The concept of coping and stress theories regarding human-technology interactions have been appearing in psychology since the 1970s, with human-computer interactions receiving the most attention (Brod, 1984; Hudiburg, 1995; Weil *et al.*, 1990). The common definition of coping is "the cognitive and behavioral efforts to manage specific external and internal demands that appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Lazarus and Folkman (1984) suggested that coping is classified in two ways, problem-focused and emotion-focused coping. Problem-focused coping includes direct efforts to improve stressful situations and attempts to deal with the cause of problem. Emotion-focused coping includes attempts to modify the individual's way of thinking by altering one's goals and values (Lazarus & Folkman, 1984). Subsequent studies have continually illustrated the results of various coping strategies, including behavioral coping, cognitive coping, and avoidance (Holahan & Moos, 1987); active, cognitive, social support coping, and avoidance (Carver *et al.*, 1989); problem-focused, social-support coping, and avoidance (Amirkhan, 1990).

Duhachek (2005) synthesized these studies and showed three dimensions of coping related to consumer behavior: (a) active coping, such as action-based coping, rational thinking, and positive thinking; (b) expressive support seeking, such as emotional venting, instrumental support, and emotional support; and (c) avoidance, such as avoidance and denial. Mick and Fournier (1998) categorized consumer coping into the categories of pre-acquisition or consumption according to the stages of purchase. Coping strategies against stress include (a) pre-acquisition-avoidance strategies: ignoring the problem, refusing to deal with the problem, and delaying confronting the problem, (b) pre-acquisition active strategies: pretesting, using purchase heuristics (choosing the latest model, a basic model, an expensive model, a familiar brand, or a reliable brand), (c) consumption-avoidance strategies: neglect, abandonment, and distancing, and (d) consumption-active strategies: accommodation, partnering, and mastering (Mick and Fournier 1998).

Next, self-efficacy has been suggested as a key predictor of stress levels and coping behaviors. Self-

efficacy, defined as an individual's belief in his or her own competence and capabilities (Bandura, 1994), decreases stress levels (Kim & Yeo, 2007; Rosen & Weil, 1995) and positively influences active coping or expressive support seeking and negatively influences avoidance (Duhachek & Iacobucci, 2005).

Regarding coping outcomes, recent studies have demonstrated that each coping strategy complements other coping strategies (Duhachek, 2005). Expressive support seeking and avoidance are no longer considered inferior to active coping; furthermore they are more functional and beneficial to an individual's well-being (Gould, 1999; Pavia & Mason, 2004). Stress researchers also have strongly recommended that further studies empirically examine coping outcomes to complete our understanding of the process of coping with stress (Duhachek & Iacobucci, 2005; Yi & Baumgartner, 2004). And behavioral researches on stress have proposed the detailed coping outcomes for subsequent studies: user satisfaction (Andreasen, 1984; Mick & Fournier, 1998) and stress reduction (Duhachek, 2005; Moschis, 2007) while psychological studies proposed health outcomes such as depression and escapist drug use (Stein & Nyamathi, 1999).

Gender Differences in Coping and Stress

Numerous studies examining gender differences in coping strategies have found that women are more likely to select expressive support seeking or avoidance, whereas men are more likely to select active coping (Endler & Parker, 1990; Folkman & Lazarus, 1985; Ptacek *et al*., 1994). In addition, it has been argued that as compared to men, women are more likely to engage in risky behavior or become depressed as coping outcomes (Matud, 2004; Stein & Nyamathi, 1999). Prior studies also found that women with a higher educational level feel less stress than other women (Matud, 2004), and women with higher self-esteem experience less stress and are able to cope more adaptively (Holahan & Moos, 1987; Stein & Nyamathi, 1999).

But, until the late 1980s, many women's studies demonstrated that technologies had been developed by men to exclude and control women (van Zoonen, 1992; Wajcman, 2010). Recent researches, however, have suggested that digital technologies were changed from business media to social media and the boundaries between women and men in the use of mobile phones were collapsed (Ling, 2004; Spender, 1995; Wajcman, 2010). Lu and Liu (2011) and Özcan and Kocak (2003) showed that there are no significant gender differences in using mobile phones. And, in the digital age, the gender differences in self-efficacy and coping behaviors may be decreasing over time because of social changes in gender roles (Emslie, Fuhrer, Hunt, Macintyre, Shipley, & Stansfeld, 2002; Lengua & Stormshak, 2000).

METHOD

Samples

We conducted a survey via e-mail targeting a purposive sample of Koreans ($N = 1{,}000$) in 2009. Respondents with experience in using mobile phones were allowed to respond to the survey. All types of mobile phones, such as feature phones or smart phones, were included in the survey. Respondents were selected from over a half million people of on-line panel through an independent, online, market-research firm. Overall, 1,876 surveys were sent out by e-mail and 1,325 were successfully completed and returned; the response rate for the study was 70.6 percent. Of these, we assigned samples to demographic groups based on age, gender, and residential area, which resulted in 1,000 samples that were used in the final data analysis. As shown in Table 1, each age group, 15-24, 25-34, 35-44, and 45-54, had approximately the same number of respondents; additionally, an equal number of women and men responded to the survey. A monthly household income was not significantly different with regard to gender ($\chi^2(4) = 2.026$), and there were significant gender differences in education status ($\chi^2(3) = 50.648$, $p < .001$): women are more educated than men.

Measures

The summary of measures and descriptive statistics of the constructs for women and men is presented in Table 2. The survey presented a total of three types

Tabel 1. *Sample Characteristics*

Personal Characteristics	Frequency (%)		
Gender	Female	Male	Total
	500 (50.0)	500 (50.0)	1,000 (100.0)
Age			
15-24	125 (12.5)	125 (12.5)	250 (25.0)
25-34	125 (12.5)	125 (12.5)	250 (25.0)
35-44	125 (12.5)	125 (12.5)	250 (25.0)
45-54	125 (12.5)	125 (12.5)	250 (25.0)
Residential area (%)			
Seoul	150 (15.0)	150 (15.0)	300 (30.0)
Gyeonggi-do	150 (15.0)	150 (15.0)	300 (30.0)
Pusan	50 (5.0)	50 (5.0)	100 (10.0)
Daegu	50 (5.0)	50 (5.0)	100 (10.0)
Daejeon	50 (5.0)	50 (5.0)	100 (10.0)
Gwangju	50 (5.0)	50 (5.0)	100 (10.0)
Income (Total monthly family income)			
Less than 1,640 dollars	127 (12.7)	123 (12.3)	250 (25.0)
1,640-less than 2,460 dollars	123 (12.3)	119 (11.9)	242 (24.2)
2,460-less than 3,280 dollars	93 (9.3)	97 (9.7)	190 (19.0)
3,280-less than 4,100 dollars	86 (8.6)	100 (10.0)	186 (18.6)
Above 4,100 dollars	71 (7.1)	61 (6.1)	132 (13.2)
$\chi^2(4) = 2.026$			
Education status (%)			
High school or lower	110 (11.0)	193 (19.3)	303 (30.3)
Undergraduate	92 (9.2)	53 (5.3)	145 (14.5)
College degree	245 (24.5)	236 (23.6)	481 (48.1)
Master's degree or higher	53 (5.3)	18 (3.6)	71 (7.1)
$\chi^2(3) = 50.648^{***}$			

Notes: Values are given as frequency (percentage, %). Income statistics were provided in the Korean won and were converted to U.S. dollars based on the exchange rate in July and August 2009: 1 dollar = 1,220 won.
$N = 1{,}000$.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

of stress based on the stressors listed by Hudiburg (2003) and Mick and Fournier (1998). The types of stress presented in the survey were (a) runtime error: the breakdown or malfunction of mobile phones (40%); (b) incompetence: the individual's inability to use mobile phones (33.6%); and (c) dependence on mobile phones: disruption in an individual's daily life, resulting from excessive use of mobile phones (26.4%). There were no significant gender differences in the stress types.

Stress levels were assessed using two items: frequency and severity of stress, which was adopted from prior studies (Hudiburg, 1995; Rosen & Weil, 1995). Coping behaviors were categorized according to three variables: active coping, expressive support seeking, and avoidance, which were developed from prior studies of consumer coping (Duhachek, 2005; Moshis, 2007). Coping outcomes were measured with two variables derived from prior studies: stress reduction and user satisfaction (Andresen, 1984; Mick & Fournier, 1998). Finally, self-efficacy was estimated with two variables derived from previous studies (Duhachek & Iacobbuci, 2005; Rosen & Weil, 1995), which included asking respondents about their levels of knowledge and ability in using mobile phones. As shown in Table 2, skewness and kurtosis statistics of the constructs met the requirements of normal distribution (Hong *et al.*, 2003). The results of the confirmatory factor analysis and Cronbach's α coefficients, for women and men, suggested that all parameters were loaded significantly on their respective latent variables. Descriptive and distributional data analysis was conducted in SPSS 16.0. To answer the research questions, LMC and MSR using SEM were performed in AMOS 16.0.

Table 2. *Measures, Descriptive and Distributional Statistics and Confirmatory Factor Loadings for Women and Men*

(Women/Men)	Mean [a]	SD [b]	Skewness	Kurtosis	FL [c]
Stress level (α = .75/.65)					
How often do you feel stressed when you use a mobile phone?	3.61//3.42	1.11/1.09	-.67/-.051	-.78/-1.14	.89/.91
How severe is your stress when you use a mobile phone?	3.90/3.67	1.06/1.12	-1.13/-.78	.50/-.52	.59/.48
Self-efficacy (α = .78/.81)					
I am an expert at using a mobile phone.	3.35/3.79	1.19/1.05	-.27/-.82	-1.37/-.43	.68/.62
I can tell him how to use a mobile phone, if he asked me.	3.09/3.53	1.19/1.17	-.09/-.57	-1.45/-.97	.88/.92
Coping behaviors					
Active coping (α = .70/.72)					
I changed my routines according to the perceived requirements of a mobile phone.	3.06/3.03	1.27/1.28	-.09/-.07	-1.43/-1.44	.58/.65
I established a close, committed relationship of heartfelt attachment with a mobile phone	3.18/3.21	1.29/1.31	-.33/-.20	-1.32/-1.40	.78/.77
I dominated a mobile phone by thoroughly learning its operations, strength, and weakness.	3.42/3.52	1.23/1.23	-.57/-.68	-.10/-.81	.73/.76
Expressive support seeking (α = .66/.71)					
I told others how I felt and sought out others for comfort.	2.73/2.52	1.29/1.27	.16/.45	-1.44/-1.20	.55/.54
I asked someone I thought could help me determine what to do.	3.46/3.18	1.34/1/36	-.60/-.25	-1.03/-1.39	.80/.83
I shared my feelings with others who had similar experiences.	2.98/3.03	1.41/1.35	-.02/-.03	-1.50/-1.46	.63/.70
Avoidance (α = .65/.72)					
I showed temporary indifference toward a mobile phone.	2.85/2.71	1.21/1.21	.03/.31	-1.45/-1.31	.55/.58
I declined to use of a mobile phone.	2.79/2.61	1.33/1.31	.15/.37	-1.44/-1.28	.64/.62
I physically placed a mobile phone in a remote site and used it less frequently.	2.59/2.43	1.26/1.23	.34/.57	-1.31/-1.02	.91/.83
Coping outcomes					
Stress reduction (α = .84/.87)					
Did you calm your stressful feeling?	3.48/3.42	1.08/1.13	-.65/-.63	-.86/-.91	.88/.87
Did you get rid of your stress?	3.26/3.20	1.16/1.20	-.14/-.08	-.73/-.84	.81/.81
User satisfaction (α = .79/84)					
Were you satisfied with your use of the device and your coping behavior?	3.44/3.47	1.08/1.15	-.63/-.64	-.94/-.86	.79/.83
Were you satisfied with the consuming process including coping process?	3.08/3.21	1.15/1.16	.01/.02	-.56/-.74	.78/.81

Notes: [a] Mean is from a five-point scale. [b] SD means standard deviation. [c] FL means factor loading and all estimates are statistically significant at $p < .05$.

RESULTS

Tests of Invariance

As stated above, this study used the following approach: LMC and MSR in SEM. SEM has become one of the most popular methods in multivariate analysis; it involves greater theoretical meaningfulness and cross-population stability, by controlling measurement errors and testing for a more complex set of relationships than regression or ANOVA methods do (Kim, Kim, & Hong, 2009; Motl, Dishman, Saunders, Dowda, Felton, Ward, & Pate, 2002; Yuan & Bentler, 2000). And it is important to satisfy the invariance constraints, because multi-group comparisons may be meaningless without measurement invariance, (Hancock, 1997; Hong *et al*., 2003).

As shown in Table 3, we conducted measurement

Table 3. *Fit Indices for Invariance Tests*

	χ^2	*df*		$\Delta\chi^2$	Δ *df*	NNFI	RMSEA (90% CI)
Latent mean analysis							
Configural invariance : Model 1 (Unconstrained Model)	581.05	196		-	-	.914	.043 (.039-.048)
Full metric invariance : Model 2	590.20	206	(Model 1 vs 2)	9.15	10	.919	.042 (.038-.046)
Full metric and full scalar invariance : Model 3	684.37	223	(Model 2 vs 3)	94.17 [a]	17	.909	.045 (.041-.049)
Full metric and partial scalar invariance : Model 4	606.62	217	(Model 2 vs 4)	16.42	11	.921	.042 (.038-.045)
Full metric, partial scalar, and factor variance invariance : Model 5	610.02	224	(Model 4 vs 5)	3.4	7	.925	.041 (.037-.045)
Multi-group structural regression analysis							
Unconstrained model : Model 6	632.83	212		-	-	.911	.044 (.040-.048)
Full metric invariance : Model 7	677.41	222	(Model 6 vs 7)	44.59 [a]	10	.908	.045 (.041-.049)
Partial metric invariance : Model 8	637.95	221	(Model 6 vs 8)	5.12	9	.916	.043 (.039-.-047)
Partial metric invariance and path coefficient invariance : Model 9	659.19	234	(Model 8 vs 9)	21.24	13	.918	.042 (.039-.046)

Note: NNFI means non-normed fit index, RMSEA means root-mean-square error of approximation, CI means confidence interval.
[a.] The χ^2 value is statistically significant at $\alpha = .05$ and the test of the invariance is rejected.

invariance tests sequentially across gender groups, which are the pre-requisites for LMC (Steenkamp & Baumgartner, 1998): (a) configural invariance, (b) metric invariance, and (c) scalar invariance. In the first step, configural invariance can be met if the unconstrained model structure is the same across groups. Once configural invariance is satisfied, more restrictive models can be tested and the configural model provides the basis for comparison with all subsequent models (Bollen, 1989; Hong et. al., 2003). In this study, the model fit indices of the unconstrained models were satisfactory for both women and men: (a) $\chi^2(98) = 257.37$, RMSEA = 0.047, TLI = 0.95, CFI = 0.96 for women and (b) $\chi(98) = 278.13$, RMSEA = 0.055, TLI = 0.93, CFI = 0.95 for men based on Bentler (1990) and Browne and Cudeck (1993) (not shown in Table 3).

The configural invariance was supported, and the unconstrained model (Model 1) also demonstrated a good fit. Model 1 is the baseline models without any constraints. In the second step, metric invariance was tested by constraining the factor loadings between latent variables and fixing observed variables to be equal across gender groups. The step also examined the structural relationships among other constructs, across gender groups (Kim *et al*., 2009). In Model 2, the factor loadings were constrained to be equal across gender groups. Because the chi-square difference between the metric invariance model (Model 2) and the unconstrained model (Model 1) was not statistically significant ($\Delta\chi^2 = 9.15$), full metric invariance was supported with the better fits of NNFI and RMSEA (ΔNNFI = 0.005, ΔRMSEA = -.001). In the last step, we tested scalar invariance by fixing the intercepts of the indicators to be equal across gender groups (Hong *et al*., 2003; Meredith, 1993). In Model 3, all seventeen intercepts of the seven indicators were fixed to be equal across gender groups. The chi-square difference between the scalar invariance model (Model 3) and the metric invariance model (Model 2) was statistically significant ($\Delta\chi^2 = 94.17$); scalar invariance was not supported, and the NNFI and RMSEA also deteriorated substantially (ΔNNFI = -0.010, ΔRMSEA = 0.003). When compared to Model 3, in Model 4 six out of seventeen intercepts were relaxed for significant improvement. By relaxing the constraints of six intercepts, that is two intercepts of stress levels, two intercepts of expressive support seeking, and two intercepts of self-efficacy, based on significant modification indices, to make cross-gender comparisons meaningful (Steenkamp & Baumgartner, 1998), the chi-square difference between the partial scalar invariance model (Model 4) and the metric invariance model (Model 2) was not statistically significant ($\Delta\chi^2 = 16.42$) and partial scalar invariance was supported

with the better fits of NNFI and RMSEA (ΔNNFI = 0.002, ΔRMSEA = 0.00). In Model 5, the values of the factor variance were fixed to be equal across gender groups in order to test if the variance values of the six factors were equal across gender groups, and chi-square difference between Model 4 and Model 5 was not statistically significant ($\Delta\chi^2 = 3.4$) and Model 5 shows the better fits of NNFI and RMSEA (ΔNNFI = 0.004, ΔRMSEA = -0.001); therefore, we continued to explore gender differences through latent means.

Table 3 also shows the results of the invariance test for MSR. First, the indices of the unconstrained models of MSR demonstrated good fits for both women and men: (a) $\chi^2(106) = 296.05$, RMSEA = 0.059, NNFI = 0.92, CFI = 0.94 for women and (b) $\chi^2(106) = 336.78$, RMSEA = 0.066, NNFI = 0.91, CFI = 0.93 for men (not shown in Table 3). Then, we tested measurement invariance by fixing factor loadings and path coefficients to be equal across gender groups in a hierarchical order (Kim *et al*., 2009; Schöllgen *et al*., 2011). First, Model 6 is the baseline model without any constraints. To test metric invariance, in Model 7, we constrained all factor loadings to be equal across gender groups. Since the chi-square difference was statistically significant ($\Delta\chi^2 = 44.59$), the metric invariance (Model 7) was not supported, and the NNFI and RMSEA also deteriorated substantially (ΔNNFI = -0.003, ΔRMSEA = 0.001); as such, in Model 8, we relaxed the constraint of an indicator, such as user satisfaction, based on significant modification indices. Then, the chi-square difference between the partial metric invariance model (Model 8) and the unconstrained model (Model 6) was not statistically significant ($\Delta\chi^2 = 5.12$), and partial metric invariance was supported with better fits of NNFI and RMSEA (ΔNNFI = 0.005, ΔRMSEA = -0.001). In addition, the fit of the partial metric invariance model was satisfactory, as shown in Table 3. In the next step, in Model 9, we tested whether the relationships among the constructs differed between women and men by fixing the unstandardized path coefficients to be equal across gender groups. Because the chi-square difference between the path coefficient invariance model (Model 9) and partial metric invariance model (Model 8) was not statistically significant at $\alpha < .05$ ($\Delta\chi^2 = 21.24$), path coefficient invariance was achieved with better fits of NNFI and RMSEA (ΔNNFI = 0.002, ΔRMSEA = -0.001). Thus, given that the assumptions of measurement invariance were met, we examined gender differences in path coefficients of the MSR model.

Latent Mean Differences

Table 4 presents latent mean estimates for women and men. We designated men as a reference group and fixed their latent means to zero in order to use the latent means as a comparison basis with women. The significance of the latent means parameter estimates for women identifies the significance of gender differences. We found several gender differences statistically significant. Women reported higher stress levels (latent mean = 0.10) and lower self-efficacy (latent mean = -0.38) than men. Regarding coping strategies, women chose expressive support

Table 4. *Latent Mean Analysis Results*

Construct	Women	Men	Effect size (d)
Stress level	.10*** (3.76)	.00 (3.55)	.43
Self-efficacy	-.38*** (3.08)	.00 (3.54)	-.72
Active coping	-.04 (3.22)	.00 (3.25)	-.06
Expressive support seeking	.13** (3.06)	.00 (2.91)	.27
Avoidance	.10* (2.74)	.00 (2.58)	.26
Stress reduction	.07 (3.37)	.00 (3.31)	.05
User satisfaction	.02 (3.26)	.00 (3.34)	.04

Note: The latent mean values for men were set to zero. The arithmetic means are presented in parentheses.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5. *Multi-group Structural Regression Analysis Results*

Structural path	$\Delta\chi^2$	Δdf	Women B (β)	Men B (β)
Self-efficacy → Stress level	3.21	1	-.198* (-.122)	-.007 (-.006)
Self-efficacy → Active coping	.09	1	.244*** (.221)	.276*** (.306)
Self-efficacy → Expressive support seeking	.35	1	.132* (.127)	.042 (.056)
Self-efficacy → Avoidance	1.29	1	.080 (.093)	.011 (.014)
Stress level → Active coping	.83	1	.045 (.067)	044 (.057)
Stress level → Expressive support seeking	1.01	1	.046 (.072)	.084* (.132)
Stress level → Avoidance	.07	1	.087** (.165)	.097** (.143)
Active coping → Stress reduction	2.16	1	.506** (.366)	.665*** (.490)
Active coping → User satisfaction	6.39	1	.570*** (.408)$_a$	.854*** (.629)$_b$
Expressive support seeking → Stress reduction	2.17	1	.437*** (.297)	.278*** (.170)
Expressive support seeking → User satisfaction	.93	1	.210** (.141)	.103 (.063)
Avoidance → Stress reduction	1.96	1	-.026 (-.015)	.127 (.082)
Avoidance → User satisfaction	5.76	1	-.146 (-.081)$_a$	.128 (.083)$_b$

Note. Coefficients with different subscripts differ significantly at $\alpha < .05$ according to change of chi-square of model fit when the path coefficients are fixed to be equal across gender groups.
*$p < .05$; **$p < .01$; ***$p < .001$.

seeking (latent mean = 0.13) and avoidance (latent mean = 0.10) more frequently than men. To adapt these latent mean differences to common estimates, we used Cohen's *d* effect size index (Hong *et al*., 2003; Kim *et al*., 2009). In order to compute the *d* effect size index, the latent means for women, which indicate the gender differences, were divided by common standard deviation across gender groups. Because common standard deviation can be used when the homogeneity of variance assumption is satisfactory, we tested the factor variance invariance and found it was supported (the difference of Model 4 and 5: $\Delta\chi^2 = 3.4$, ΔNNFI = 0.004, ΔRMSEA = -0.001), as shown in Table 4. Based on Cohen's interpretations (Cohen, 1988), we found the *d* effect sizes defined as large in self-efficacy ($d = -0.72$), medium in stress levels ($d = 0.43$), and relatively small in expressive support seeking ($d = 0.27$) and avoidance ($d = 0.26$).

Relationship Differences

Table 5 shows the relationships among stress levels, self-efficacy, coping behaviors, and coping outcomes. For both women and men, the relationships between self-efficacy and active coping (β: women / men = .221 / .306), stress levels and avoidance (β: women / men = .165 / .143), active coping and stress reduction (β: women / men = .366 / .490), active coping and user satisfaction ($\hat{a}$: women / men = .408 / .629), and expressive support seeking and stress reduction (β: women / men = .297 / .170) were significant. For women, self-efficacy negatively affected stress levels ($\beta = -.122$) and expressive support seeking was positively related to user satisfaction ($\beta = .141$). However, for men, those relationships were not statistically significant. Among the relationships noted above, only the positive relationship between active coping and user satisfaction differed significantly across gender groups ($\Delta\chi^2 = 6.39$), and the relationship was stronger in men. Although the relationship between avoidance and user satisfaction differed across gender groups ($\Delta\chi^2 = 5.76$), path coefficients for both gender groups were not statistically significant.

DISCUSSION

This study tested gender differences during the stress and the coping process, including coping outcomes

and self-efficacy. In support of previous findings on gender and stress (Mick & Fournier, 1998; Miller & Kirsch, 1987), our results showed that women were more vulnerable to stress and experienced significantly higher levels of stress than men. Furthermore, based on our results, women did not appear to have the same ability to use mobile phones as men did, in contrast to prior studies, which suggested that women use mobile phones as skillfully as men (Lu & Liu, 2011; Özcan & Kocak, 2003). However, for women, self-efficacy significantly reduced stress levels, whereas that relationship was not significant for men. Therefore, to reduce women's stress levels while using mobile phones, it is important to increase women's knowledge and ability to do so. Mobile phone manufacturers and consumer educators should place a greater emphasis on allowing women to be educated more often. Additionally, training systems and the content and format of product information such as labeling should be designed to appeal to women. For example, user education with easily accessible and basic information might be helpful.

We expected that there would be a significant gender difference in coping behaviors and focused on identifying gender differences in coping outcomes. Partially supporting prior studies on gender and coping (Folkman & Lazarus, 1985; Ptacek *et al*., 1994), our findings showed that women selected expressive support seeking and avoidance more frequently than men; however, there was no significant gender difference in active coping. In comparison to men, women tended to use all three coping strategies more equally. Regarding coping outcomes, as we expected, women coped as effectively as men although we did find significant gender differences in coping strategies, in contrast to prior studies (Matud, 2004; Stein & Nyamathi, 1999). In addition, the influence of coping strategies on coping outcomes was different across gender groups: the influence of expressive support seeking to reduce stress was much higher for women and lower for men, and expressive support seeking positively affected user satisfaction only for women. Thus, based on our results, we suggest that providing female customers with exclusive sales and support staff, who are trained to use expressive support seeking may also be helpful. And, the relationship between active coping and user satisfaction was significantly different across gender groups, and when men coped aggressively, they were more satisfied than women were when they coped aggressively. Therefore, we suggest that both women and men choose their own effective coping strategies: women use active coping and expressive support seeking almost equally, whereas men mostly use active coping. Both genders recognize which coping strategy is beneficial for reducing their stress and enhancing their satisfaction.

The methodology of this study has several limitations, and caution must be exercised when drawing conclusions from this study. The sample used in this study excluded people older than 54 and those younger than 15 because these two demographics were not considered to have had sufficient experience in using mobile phones. Individuals who live in small towns were also excluded because the study sample was selected from six major cities for the convenience of data collection. Those who were excluded in this sampling were more likely to be vulnerable to stress while using mobile phones. Therefore, samples that were excluded in this study such as elderly people or rural residents should be considered in future studies. In addition, all data were gathered by a single informant through self-report, non-observational methods. Therefore, data collection using observations, face-to-face surveys, or in-depth interviews, and samples that were excluded in this study such as elderly people or rural residents should be considered in future studies.

This study has a fundamental contribution in understanding stress and coping while using mobile phones. First, in order to test the gender differences, this study used latent means comparison and multi-group structural regression in structural equation modeling, which control measurement errors and hold significant theoretical meaningfulness and cross-population stability. We developed a structural model of stress and coping, which includes coping outcomes and is distinct from the models used in prior studies that only investigated the predictors of coping. The empirical data on the structural relationships allowed us to identify the influence of

coping strategies on coping outcomes and to examine gender differences in the coping process. Future studies should include additional dimensions to determine more realistic relationships among the constructs. Particularly, the finding that self-efficacy was the key predictor of stress levels, coping behaviors should be extended to future studies by objectively evaluating an individual's ability to use phones.

Next, we analyzed stress resulting from the use of mobile phones unlike prior studies, which researched stress resulting from the use of computers (Brod, 1984; Hudiburg, 2003; Weil *et al*., 1990). Future studies on the stress associated with using the latest electronics should be conducted continually. Finally, we found that although women are more vulnerable to stress, they cope as effectively as men using their own personal coping strategies, which contradicts prior researches (Matud, 2004; Stein & Nyamathi, 1999). And we proposed how both men and women cope more effectively based on our results.

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