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ABSTRACT

This document summarizes research which investigated coping strategies used by computer users who experienced varying degrees of computer-stress. A questionnaire, distributed to enrollees in a college course in which computer use was required, elicited information about computer abilities, anxiety, and self-esteem. Participants (n=83) were also asked to rate the stressfulness of a computer problem and to complete a scale which measured coping strategies. Statistical analyses of differences between high computer-stress users and low computer-stress users revealed that the former category had lower self-rated computer abilities, lower self-esteem, and higher levels of somatization and anxiety. High computer-stress users employed a variety of coping strategies, all emotionally focused, while low computer-stress users tended to adopt problem-solving strategies in dealing with computer problems. Two tables present numerical data. (Contains 24 references.) (BEW)

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Coping with computer-stress¹

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Summary: This research investigated coping strategies used by computer users who experienced varying degrees of computer-stress. A research questionnaire was constructed and given to 90 students (83 provided complete replies) enrolled in college courses where computers use was part of the course requirements. The questionnaire contained questions about computer use information, ratings of computer knowledge and abilities (self-rating, and Computer Self-Efficacy Scale), the Computer Hassles Scale (a measure of computer-stress), measures of somatization and anxiety (SCL-90), and Rosenberger's Self-Esteem Scale. The participants were asked to describe and rate the stressfulness of a computer problem and to complete the Ways of Coping Scale (a measure of coping strategies). A Severity of Hassles score was determined for each participant from the Computer Hassles Scale. The Severity of Hassles score was used to identify high computer-stress users and low computer-stress users. Within the range of the research participant's Severity of Hassles scores, high computer-stress users were those who scored in the upper 25% of the range and low computer-stress users were those who scored in the lower 25% of the range.

Statistical analyses of differences between high computer-stress users and low computer-stress users revealed that high computer-stress users had lower self-rated computer abilities, lower self-esteem, and reported higher levels of somatization and anxiety. High computer-stress users, in contrast to low computer-stress users, significantly employed at higher levels confrontive, self-controlling, accepting responsibility, and positive reappraisal coping strategies in dealing with computer problems. The coping strategies employed by high computer-stress users were primarily emotional-focused coping strategies. The low computer-stress group tended to adopt a problem-solving coping strategy in dealing with computer problems.

There has been considerable research focusing on the effects of human-computer interactions (Rosen & Maguire, 1990). These investigations have focused on aspects of human perception, evaluation, and reaction. The results are examples of "computerisms": computer anxiety, computer attitudes, computer aversion, computerphobia, computer users' stress and computer self-efficacy. In the area of computer users' stress, Hudiburg (1992) factor analyzed the Computer Technology Hassles Scale, a stress index for using computer technology, to produce a shorter scale, the Computer Hassles Scale (Hudiburg, 1995). This scale has been shown to be a valid measure of computer users' stress based on correlates with reported stress outcomes (somatization and anxiety) and general stress levels (Hudiburg, Ahrens, & Jones, 1994; Hudiburg, Brown, & Jones, 1993).

Richard Lazarus and his colleagues (Lazarus, 1993) have done extensive research on psychological stress. He has developed a model of the stress process. Psychological stress is concerned with evaluating the antecedents (stressors), the responses to stress (immediate and long term) and the mediating processes between antecedents and stress responses (Lazarus, 1966). The important mediating processes have been theorized to be the appraisal (primary and secondary) of the stressor as potentially threatening, harmful, or challenging and the coping strategies to deal with the harm, threat, or challenge (Lazarus & Folkman, 1984). Lazarus (1993) has emphasized coping with stress as a dynamic process. According to his model, coping affects stress reactions in two ways: problem-focused coping and emotion-focused coping. Problem-focused coping results in a change in a person's relationship with his/her environment and thus a change in the reaction to the stress. If a person changes the way he/she attends to or interprets the situation, he/she is using emotion-focused coping strategies.

The interest in the stress-coping relationship has spawned the development of several measurements of coping in the past 15 years (Cohen, 1991). These coping measures can be divided into two main approaches: personality trait and episodic. Much stress and coping research has concentrated on measuring strategies individuals use in coping with a particular stressful situation. The episodic approach benefits from the view that coping is a dynamic process and not static, which is assumed by the personality trait approach. To this end, one of the first situational coping measures was the Ways of Coping Questionnaire (Folkman & Lazarus, 1980). This questionnaire measured the two types of general coping strategies: problem-focused and emotion-focused. This coping measure led to the development of a number of competing measures designed to fine tune the assessment of coping strategies (Amirkhan, 1990; Billings & Moos, 1981; Carver, Scheier, & Weintraub, 1989; Endler & Parker, 1990; Endler, Parker, & Butcher,

1993; Folkman & Lazarus, 1985; Pearlin & Schooler, 1978; Vitaliano, Russo, Carr, Maiuro, & Becker (1985). These coping measures tap the two general coping dimensions laid out in Lazarus' theory: problem-focused and emotion-focused but they differ in the number of specific coping strategies. The number of coping strategies measured varied from two or three (Amirkhan, 1990; Billings & Moos, 1981; Endler & Parker, 1990; Endler, *et al.*, 1993; Pearlin & Schooler, 1978) to seven or eight (Folkman & Lazarus, 1985; Vitaliano, *et al.*, 1985) and as high as thirteen (Carver, *et al.*, 1989). These scales varied in terms of their demonstrated psychometric properties. Most of the scales were fairly reliable but some suffered from lack of evidence for construct validity. The task of choosing a coping strategy measure is difficult.

The current research uses the Ways of Coping Scale (Folkman & Lazarus, 1985), a revision of the Ways of Coping Questionnaire. This scale measures eight coping strategies (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986): confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem-solving, and positive reappraisal. The perceived stress of the problem and the perceived coping efficacy are also addressed in this study. This study includes the assessment of the self-esteem of the subjects because self-esteem has been shown to be a determinant in the use of certain coping strategies (Terry, 1994). This study was limited to coping with computer problems.

Little research has been done on analyzing coping strategies in human-computer interactions. Aronsson and Strömberg (1993) studied coping styles used by VDT users in Sweden in dealing with computer breakdowns. Their study did not use any *a priori* administered coping strategy questionnaire that would be commonly used in coping with stress research but used *post hoc* defined response patterns. The current study will utilize a questionnaire that specifically identifies the type of coping strategies used by a computer user in dealing with a perceived stressful computer problem.

METHOD

The research was conducted with college student computer users. A research questionnaire was constructed and given to each participant. The questionnaire included a section for participant information (e.g., gender, age, classification, major), computer experiences (e.g., years of use, hours of weekly use, computer ownership), and a self-rating of computer knowledge (seven point rating scale, anchored by no knowledge - value 1 and knowledgeable - value 7). The questionnaire included several Likert format scales. The Computer Self-Efficacy Scale (Murphy, Coover, & Owen, 1989) assessed a computer users'

perception of abilities using a graded five-point response, anchored by very little confidence (value 1) to quite a lot of confidence (value 5). The Computer Hassles Scale (Hudiburg, 1995) assessed the level of computer users' stress employing a graded four-point response to severity, anchored by not at all (value 0) and extremely severe (value 3). The somatization and anxiety items of the Symptom Checklist-90 (SCL-90) (Derogatis, Lipman, & Covi, 1973) were used to assess the level of stress responses or complaints employing a four-point response to distress, anchored by not at all (value 1) and extreme distress (value 4). Rosenberger's (1965) Self-Esteem Scale was used to evaluate participants' self-esteem utilizing a four-point graded response, anchored by strongly agree to strongly disagree. The participants were asked to describe the most stressful computer use episode they have experienced in the past month and to rate how stressful it was on a 7-point scale, with 7 indicating that it was the most stressful. The 66 item Ways of Coping Scale (Folkman and Lazarus, 1985) assessed the coping strategies used by the participants. The participants were asked to evaluate on a graded four-point scale the extent which he/she used a coping response, anchored by not used (value 0) and used a great deal (value 3). Eight specific coping scales were scored from the participants' responses using the Folkman, *et al.* (1986) scoring scheme. Finally, participants were asked to indicate on a 5-point scale, anchored by not well at all (value 1) and very well (value 5), how well they thought they had handled the computer problem "given the circumstances".

RESULTS

Data: Questionnaires from 90 participants were returned and 83 of the questionnaires had complete responses and were used for data analyses. The categorical data were tabulated. The sample had slightly more males (51%) and typically had junior/senior status (57%). Most of the participants reported taking a computer course (94%) and 45% reported owning a computer. The mean age was 25.9 years, the mean years of computer experience was 5.0 years and mean weekly computer use was 11.4 hours. The mean self-rating of computer knowledge was 4.33 ($SD = 1.28$). The commonly reported type of computer problems were: hardware (7), software (9), lack of knowledge (19), lack of time (10), computer lock-up (7), and loss of input (9). Scores on the various scales were determined by summing across the graded response items. The Computer Self-Efficacy Scale yielded a total score (possible range 29 to 145) and two subscale computer skills (basic & advanced) scores. The Computer Hassles Scale yielded a Severity of Hassles score (possible range 0 to 117), a high score indicating a high level of computer-stress. The somatization/anxiety items of the SCL-90 yielded a total score (possible range 0 to

88) and separate somatization and anxiety scores. The Self-Esteem Scale yielded a single score (possible range 10 to 40), low scores were indicative of high self-esteem. The Ways of Coping Scale was scored using the eight factor scoring scheme of Folkman, *et al.* (1986). This scheme yielded eight coping strategies: confrontive coping (possible range 0 to 18), distancing (possible range 0 to 18), self-controlling (possible range 0 to 21), seeking social support (possible range 0 to 18), accepting responsibility (possible range 0 to 12), escape-avoidance (possible range 0 to 24), planful problem-solving (possible range 0 to 18), and positive reappraisal (possible range 0 to 21). High scores indicate greater use of the coping strategy. The descriptive statistics for these various measures are shown in Table 1.

 Insert Table 1 here

Correlations

Pearson correlations were computed for several of the questionnaire and scale variables. Of the many correlations computed, the correlations between the Severity of Hassles score of the Computer Hassles Scale and other variables were of interest. Severity of Hassles was significantly correlated ($r(81) = .22, p < .05$) with the total somatization/anxiety score of the SCL-90. This result is in general agreement with prior research utilizing the Computer Hassles Scale (Hudiburg, 1995; Hudiburg, *et al.*, 1983, 1984), indicating it measures computer-stress. Severity of Hassles was significantly correlated with self-rated computer knowledge ($r(81) = -.30, p < .01$), Computer Self-Efficacy -- total ($r(81) = -.31, p < .01$), and self-esteem ($r(81) = .35, p < .01$). Severity of Hassles was significantly correlated with three of the eight Ways of Coping strategies: self-controlling ($r(81) = .27, p < .05$), accepting responsibility ($r(81) = .22, p < .05$), and positive reappraisal ($r(81) = .28, p < .05$). Additionally, Severity of Hassles was significantly correlated with effectiveness of coping with the stressful computer problem ($r(81) = -.36, p < .01$). These patterns of correlations suggest that persons who experience differential levels of computer-stress have different stress outcomes and cope with the stress differently. The nature of effects of different levels of computer-stress can be analyzed by contrasting low and high computer-stress groups.

High and Low computer-stress groups

The participants were divided into low and high computer-stress groups using the severity of hassles scoring of the Computer Hassles Scale. The low computer-stress group was defined as the lower 25% and high computer-stress group was defined as the upper 25%. The low computer-stress group ($N = 21$) had a severity of stress score of 14 or less and the high computer-stress group ($N = 21$) had a severity

of stress score of 41 or greater. To determine possible differences between low and high computer-stress groups, a series of independent group t-tests was performed using several information items, the scores from the scales used in the questionnaire, and all eight of the coping strategies. Table 2 contains the means and standard deviations for the variables analyzed.

Insert Table 2 here

There were no significant differences in the ages of the two groups ($t(37) = -.607, p > .05$), the reported years of computer experience ($t(40) = .756, p > .05$), and hours of weekly computer use ($t(40) = 1.05, p > .05$). There was a significant difference in the self-rated computer knowledge ($t(40) = 3.48, p < .01$) and significant differences in all three scores from the Computer Self-Efficacy Scale, total skills ($t(40) = 2.99, p < .01$), basic skills ($t(40) = 3.40, p < .01$), and advanced skills ($t(40) = 2.16, p < .05$). There were significant differences between low and high computer-stress groups on the reported total somatization/anxiety score ($t(40) = -2.52, p < .05$), somatization ($t(40) = -2.26, p < .05$), and anxiety ($t(40) = -2.47, p < .05$). There was a significant difference found between the groups for self-esteem ($t(40) = -3.49, p < .01$).

There was no significance in the low and high groups' rated severity of the stressful computer event ($t(40) = -1.41, p > .05$). On only four of the eight coping strategies were there significant differences between the low and high computer-stress group's use of the strategies: confrontive coping ($t(40) = -2.62, p < .05$), self-controlling ($t(40) = -2.29, p < .05$), accepting responsibility ($t(40) = -2.22, p < .05$), and positive reappraisal ($t(40) = -2.09, p < .05$). The groups significantly differed in the rated effectiveness of coping with the stressful computer event ($t(40) = 4.10, p < .01$).

Based on direction of the differences between low and high computer-stress groups it can be concluded that persons who experience higher computer-stress have less computer skills and computer knowledge than those computer users who experience low stress. High computer-stress users report high levels of somatization/anxiety, a typical reaction to stress, and lower self-esteem. As contrasted to low computer-stress users, high computer-stress users are more likely to utilize a confrontive coping strategy, characterized as being aggressive and hostile. High computer-stress users are more likely to use a self-controlling strategy by regulating their feelings and actions. High computer-stress users employ the accepting responsibility strategy of acknowledging one's role in the problem and trying to put things right.

High computer-stress users more often employ positive reappraisal in order to create positive meaning by focusing on personal growth. The seemingly contradictory nature of the coping strategies used by the high computer-stress group can be explained by the moderately positive correlations (mean $r = .57$) between the eight coping strategies measured by the Ways of Coping Scale. Therefore, a computer user could be using several coping strategies at one time. In general, high computer-stress users view their coping as less effective as compared to low computer-stress users. In general, high computer-stress users were more likely to employ emotion-focused coping strategies in dealing with computer-stress. The exception is the tendency for low computer-stress users to employ the planful problem-solving strategy.

DISCUSSION

The current study showed that high and low computer-stress groups differ in how they cope with computer-stress. High computer-stress students had a greater tendency to adopt emotion-focused strategies (confrontive coping, self-controlling) than low computer-stress students. This view is consistent if one considers that the higher levels of reported anxiety reactions by the high computer-stress students had an emotional content. Like Aronsson and Strömberg (1993), the current study found that computer users who experience high computer-stress tend to report more physical (somatization) and psychic (anxiety) symptoms.

In the educational setting, students are increasingly asked to use computers as part of becoming educated. Research has shown that the use of computers can be stressful and produce a variety of reactions. The current research shows that the emotional-focused coping is employed more often in dealing with computer-stress than problem-focused coping. Development of problem-focused approaches to dealing with computer-stress should be considered by computer users and researchers.

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Table 1

Descriptive statistics for questionnaire variables and scales (N=83)

<u>Variable/ Scale</u>	<u>Mean</u>	<u>S.D.</u>
Age	25.92	7.71
Years computer experience	4.96	4.26
Hours per week computer use	11.39	12.46
Self-rated computer knowledge	4.33	1.28
Computer Self-Efficacy Scale - total	111.13	22.80
Basic skills	70.25	13.10
Advanced skills	37.04	9.72
Computer Hassles Scale - severity	31.22	22.27
computer runtime errors - severity	19.96	15.91
computer info. problems - severity	11.25	7.99
SCL-90 - Somatization/Anxiety	16.51	14.12
Somatization	8.80	8.57
Anxiety	7.71	6.68
Self-esteem	15.37	4.70
Rating of stressful computer event	4.25	1.51
Ways of Coping Scale coping strategies		
confrontive coping	4.28	3.44
distancing	5.55	3.94
self-controlling	5.67	4.53
seeking social support	5.59	3.48
accepting responsibility	3.10	3.00
escape-avoidance	5.60	4.53
planful problem-solving	7.75	5.00
positive reappraisal	5.82	4.82
stressful computer event coping effectiveness rating	3.61	1.09

Table 2

Means and standard deviations of questionnaire variables and scales for low and high computer stress groupings based on Computer Hassles Scale severity of hassles score

<u>Variable/ Scale</u>	LOW (N=21)		HIGH (N=21)	
	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>
Age	23.75	7.50	25.00	5.06
Years computer experience	4.75	3.03	4.19	2.81
Hours per week computer use	11.14	11.18	7.67	9.36
Self-rated computer knowledge**	4.95	1.24	3.57	1.33
Computer Self-Efficacy Scale- total**	118.10	20.51	97.48	24.09
Basic skills**	74.81	11.85	61.67	13.11
Advanced skills*	39.10	8.97	32.52	10.61
SCL-90 - Somatization/Anxiety*	10.86	8.60	19.67	13.51
Somatization*	5.76	5.77	10.71	8.23
Anxiety*	5.10	3.42	8.95	6.27
Self-esteem**	13.52	4.47	18.62	5.02
Rating of stressful computer event	3.71	1.73	4.38	1.28
Ways of Coping Scale coping strategies				
confrontive coping*	3.38	2.67	5.71	3.08
distancing	5.38	3.44	7.10	4.24
self-controlling*	5.09	4.24	8.14	4.40
seeking social support	5.24	3.35	5.90	3.77
accepting responsibility*	2.62	3.11	4.62	2.71
escape-avoidance	4.76	3.30	7.33	4.99
planful problem-solving	9.24	3.08	7.29	3.73
positive reappraisal*	5.38	4.01	8.24	4.82
stressful computer event coping effectiveness rating**	4.14	.91	3.00	.89

group differences: * $p < .05$ ** $p < .01$