The Health Effects of Computer Use on Personnel at the Suan Sunandha Rajabhat University

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Abstract: This survey research aimed to find the health effects of computer use on Suan Sunandha Rajabhat University's personnel. A total of 312 samples were selected out of 1401 population by simple random method. Inferential statistics were used throughout the hypothesis testing and data analysis (percentage, mean and standard deviation). The correlation between risk factors and computer-used behavior were calculated by Pearson correlation and Creamer's V coefficient (95% CI). The results indicated that the samples spend 6-10 hours of the workday on the computer. In order to create a good working environment, the organization has provided good computing facilities. The overview of computer-used behavior suggests that the personnel have regular good practice, i.e. 5-6 times per week. The research result found that the most of personnel have a regular eyestrain, eye fatigue, sore eyes and irritation symptoms at least 5-6 times per week. In addition, the personnel have regular neck, shoulder, back, waist and wrist pain symptoms at least 3-4 times per week. The result indicated that the computer user's behavior and user's health status relate to each other, and are in the same way. In conclusion, the academic staff requires the basic computer usage knowledge in order to avoid future health problems.

Keywords: Health effects, Health disorder, Computer-used behavior, Office syndrome, Computer syndrome

Introduction

Nowadays, computer is one of the main tools used in education institutes and other business sectors. On the one hand, the computer use has made life easy, but on the other hand has negative effects on human health. The extent of using a computer can cause injury to body muscles such as eyestrain, neck and shoulder pain, back pain, lumbar pain, finger numbness and locking. This may result in accumulation of injuries that goes unnoticed over a long period. The severity of the symptom depends on the physical condition and self-health care of individual computer users (Manop, 2014).

This research aimed to survey the health effects of computer use on personnel at the Suan Sunandha Rajabhat University. The research question based on the premise that computer use affects the health status of people. The result of this study will be useful to create awareness of the side effects of computer use on the physical health of the user. In addition, to avoid illness, the coordination will require between employees and agency owners to stipulate the correct computer-used behavior (e.g. Computer use, Placement of computer equipment, and Physical exercise during work) (Department of Health, Ministry of Public Health, 2014).

Materials and Methods

A. Sampling method:

In this research, a simple random sampling method was used for defining the samples from Suan Sunandha Rajabhat University staff. The samples were composed of 143 academic instructors and 169 academic supporting staff. These samples were calculated using the formula defined in Yamane, 1973.

B. Data Tools:

The questionnaire consists of four factors:

1) Bio-social factor (Table 1).
2) The leading factor: Includes computer use knowledge (Table 3) and attitude (Table 4).
3) The contributing factor: Includes computer equipment (Table 5) and working environment (Table 6).
4) The reinforcing factor: Include advice from experts or social media (Table 7).

In addition, the questionnaire also consists of the computer-used behavior (Table 8) and the health status of computer user (Table 2).

C. Data Collection:

The data collection was achieved using following four steps

1) Contact the head of department and request data collection
2) Describe the objective of the research and questionnaire
3) Distribution and follow up of the questionnaire
4) Checking the integrity of the answers

If any questionnaires were found missing, then new random sample were selected.

D. Data Analysis:

The data were analyzed using a computer software package
SPSS. Statistics were used (frequency distribution, percentage,
mean and standard deviation) to analyze data and the relationship between, 1) The risk factors and computer-used behavior, 2) The health status of computer user and computer-used behavior by Pearson correlation and Cramer's V coefficient. (Figure 1)

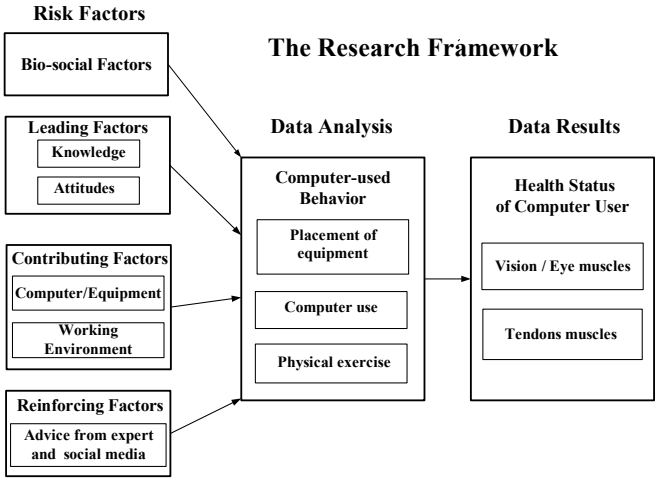

Figure 1. The research framework for data analysis

E. Quality Control:

The quality control has been tested using following two steps:
1) In order to establish the content validity, the three experts were then asked to evaluate the index of consistency (IOC). If IOC was less than 0.005, then the questions were adjusted to the experts advice.
2) In order to establish the reliability, we have chosen 39 people (samples) from the Ministry of Education with similar
working life style. The reliability has been determined using Cronbach's alpha-coefficient; the obtained reliability value was 0.9297.

Results

After complete analysis the obtained results are as follows:
1)The Bio-social factor of the samples showed in Table 1.
2) The SPSS 17 software were used to analyze the collected response from 312 samples. The demographic information showed that the most of the samples had the health related computer syndrome (computer vision syndrome, carpal tunnel syndrome, and musculoskeletal disorders).

Specific considerations showed that the samples have vision sickness and tendon muscles 5-6 times per week and 3-4 times per week respectively (Table 2).

3) The leading factors showed that the 64.1 percent of the samples have high level of knowledge in computer usage.

Specific considerations showed that the most of samples have high level of knowledge for practice in computer use as well as the health impact of excessive computer use (Table 3).

Table 1. The Bio-social factors

Number	Category	Frequency	Percentage
1	**Gender**		
	Male	141	45.2
	Female	171	54.8
2	**Age**		
	< = 30 years	174	55.6
	> 31 years	138	44.4
3	**Education level**		
	Bachelor	178	57.2
	Master	118	37.9
	Doctoral	16	4.9
4	**Position**		
	Instructor	169	54.2
	Supporter	143	45.8
5	**Starting used age**		
	> 12 years	67	21.5
	13-20 years	185	59.3
	21-30 years	47	15.1
	31-40 years	7	2.2
	41-50 years	6	1.9
6	**Used hours**		
	< 2 hrs / day	16	5.2
	3-5 hrs / day	120	38.6
	6-10 hrs / day	141	45.2
	11-15 hrs /day	25	8.1
	> 15 hrs / day	10	2.9

Table 2. Health status of computer user

Health Status	Level of Symptoms		
	$\overline{X}$	S.D.	Results
1. Vision	3.47	0.7544	5-6 times per week
2. Tendon muscles	3.37	0.7721	3-4 times per week
Overview	3.410	0.7065	5-6 times per week

Table 3. Level of computer use knowledge

Knowledge Type	Level of Opinion		
	low	moderate	high
1.Practice in computer use	19.3%	10.9%	79.8%
2.Health impacts from excessive computer use	15.1%	19.2%	65.7%
Overview	4.5%	31.4%	64.1%

4) The samples had very high positive attitudes towards computer usage.

Specific considerations of computer use attitudes showed that the samples have high awareness of computer use as well as the knowledge of avoiding the health impacts from excessive computer use (Table 4).

Table 4. Level of computer use attitudes

Attitudes Type	Level of Opinion		
	$\overline{X}$	S.D.	Results
1. Creating best practice in computer use	4.21	0.5399	highest
2. Avoiding health impacts from excessive computer use	4.08	0.5713	high
Overview	4.14	0.5114	high

5) The contributing factor showed that the overview of providing computer equipment was at a high level (Table 5).

Table 5. The contributing factor: Computer Equipment

Factors	Level of Opinion		
	$\overline{x}$	S.D.	Results
Ergonomic equipment	3.74	0.8049	high
Connection of equipment	3.81	0.9234	high
Internet Connection	3.72	0.8423	high
LCD/LED Screen	3.85	0.8071	high
Adjustable Monitor	3.77	0.8892	high
Light-Protect Equipment	3.67	1.0101	high
Standard Keyboard	3.85	0.8796	high
Comfortable Mouse	3.88	0.8413	high
Mouse Pad	3.41	1.2049	moderate
Cradle Document	3.32	1.2282	moderate
Overview	3.66	0.645	high

Specific considerations showed that every factor was at a high level. First, quantity of work, followed by temperature and light, and place of work (Table 6).

Table 6. The contributing factors: Work environment

Work Environment	Level of Opinion		
	$\overline{X}$	S.D.	Results
1. Quantity of work	3.91	0.6877	high
2. Place of work	3.66	0.6450	high
3. Temperature and Light	3.78	0.6387	high
Overview	3.75	0.5349	high

6) The reinforcing factor is nothing but the advice of computer use from experts or social media. In the overview, the samples were guided for computer use about twice a month.

Specific considerations showed that receiving information via internet is the first, other media (newspaper, radio & TV) second, and from colleagues last priority (Table 7).

Table 7. The reinforcing factors: Advice for computer use

Advice from expert and social media	Level of Guide		
	$\overline{X}$	S.D.	Results
1. Families	3.12	1.1479	2 times a month
2. Colleagues	3.33	0.9989	2 times a month
3. Doctors	2.63	1.227	2 times a month
4. Newspaper, TV & Radio	3.35	1.0274	2 times a month
5. Internet	3.36	1.0277	2 times a month
Overview	3.21	0.7919	2 times a month

7) An overview of computer-used behavior showed that the samples practiced computer use 5-6 times per week.

Specific considerations showed that samples give high priority to the placement of computer equipment, second priority for computer use and last priority for the physical exercise during the operation period (Table 8).

Table 8. Computer-used behavior

Behavior Type	Level of Practice		
	$\overline{X}$	S.D.	Results
1. Placement of Equipment	3.88	0.6734	5-6 times/week
2. Practice of computer use	3.75	0.6088	5-6 times/week
3. Physical exercise during work	3.47	0.7838	5-6 times/week
Overview	3.72	0.5643	5-6 times/week

8) The relationship between any risk factors and computer-used behavior showed that the knowledge, starting age and computer use hours per day related to computer-used behavior in a low level of relation and the same way. (r = 0.120, 0.216, 0.168, and p-value= 0.034, 0.000, 0.010)

The computer usage attitude, used computer equipment, working environment and the advice from experts or social

media related to the computer-used behavior in a moderate level of relation and the same way. (r = 0.411, 0.475, 0.580, 0.439, and *p*-value = 0.000, 0.000, 0.000, 0.000) (Table 9)
9) The relationship between health status of computer user and computer-used behavior showed that the health-side effect of vision and tendon muscles related to computer-used behavior in a low level of relation and the same way. (r = .212, .225, .181, and *p*-value = .000, .000, .000) (Table 10)

These results can conclude as follows:

1. Computer use can cause vision syndrome and tendon muscles to staff. The staff often have headache, eye muscles, neck / shoulder, wrist / finger, back, and waist pain 3-4 times per week. The effect of computer use is more on vision than tendon muscles.

Table 9. Relation between risk factors and computer-used behavior

Risk Factors / Behavior	Correlation Analysis		
	r	*p*-value	Level of Correlation
1. Knowledge	0.120*	0.034	low & same way
2. Attitudes	0.411**	0.000	moderate & same way
3. Computer Equipment	0.475**	0.000	moderate & same way
4. Work Environment	0.580**	0.000	moderate & same way
5. Advice from Sources	0.439**	0.000	moderate & same way
6. Starting Age	0.216**	0.000	low & same way
7. Hour of use	0.168**	0.010	low & same way

*Sig. Level .05, ** Sig. Level .01

Table 10. Relation between computer user's health status and behavior

Side Effect	Level of Correlation		
	r	*p*-value	Results
1. Vision	0.225**	0.000	low & same way
2. Tendon Muscles	0.181**	0.000	low & same way
Overview	0.212**	0.000	low & same way

** Sig. Level .01

2. The most of the staff started using a computer at the age of 13-20, so the injuries are accumulating continuously. The daily computer use of personnel is 6-10 hours, so the prolong use of a computer may lead to future disorder or computer related health issues.

3. The most staff possesses good knowledge and attitude of computer use. The staff had a high level of satisfaction in their workplace's computer equipment and working environment.

4. The major factors related to the staff's health behavior are the working environment, the computer equipment, the advice from an expert and social media, and the computer usage attitude.

5. The minor factors related to the staff's health behavior are the starting age of computer use, duration of computer use, and computer usage knowledge.

6. The computer use have significant side effect (vision and tendon muscles) on staff's health behavior.

The results are according to the hypothesis of this research.

Discussions

From research question: Does prolonged computer use have impact on computer users? How much duration of computer use can affect computer users? The answers are listed in Table 11.

Table 11 shows the comparison of current research results with similar research in other parts of the world. The eyestrain is very commonly syndrome in every career around the world.

Table 11. The results of computer usage's side effect researches

Author,Year & Country	Population & hours work / day	Symptoms	Suggestion
This study (2015) **Thailand**	312 Academic staff (6-10 hrs.)	Eye strain Muscle pain	Share computer manual Adjust to best practice Break & exercise
Anusit (2015) **Thailand**	Judiciary staff	Stress Disorder Eye strain Muscle pain	Use ergonomic work chair Break & exercise
Akinbinu et al. (2013) **Nigeria**	100 Security & Exchange staff (6-8 hrs.)	CVS	Regular break Blinking/checking eyes Use glare screen
Zheng et al. (2007) **China**	3 Clinical cases (5-8 hrs.)	Eye strain Neck/Back pain Headache	Adjust screen & light Warm eyelid massage Adjust sitting position
Ellahi et al., (2011) **Pakistan**	120 employees & students (> 4 hrs.)	MD* Stress disorders CVS, CTS**	Safe & comfortable computer workplace Provide job training

* MD = Musculoskeletal disorders ***CTS = Carpal Tunnel Syndrome
** CVS = Computer Vision Syndrome

The duration of prolonged computer usage is more than four hours per day. The most suggestions are daily

supplementary break and physical exercise, which can minimize the risk of computer syndrome.

Conclusions

From this research, there seems to be a connection between health problems from computer use, especially on health conditions in terms of vision and tendon muscles. From many researchers have found that working for a long time with limited motion, fixed focal distance vision, and formed muscle tension incessantly are the main cause of computer syndrome,
which is composite of Eyestrain, Pain syndromes, Local inflammations & Compression syndromes (Sudoa, 2015).

The Health and Safety Regulation 1992 (4) of United Kingdom suggests that "Should provide workers a break before their body have severe fatigue, not waiting until body shows signs of fatigue then having a break for recovery".

Therefore, we should use these finding and suggestion to reduce some risk of the health effects from computer usage. The organization should create "Workplace Wellness" for good health behavior of their employees, and the computer users should provide the appropriate break time for relaxing and reducing illness.

The suggestion of this research as follows:

1. The entity should provide a manual detailing the correct method in computer use for the employees and train them in ways to use ergonomic methods. Consequently, computer users should adjust their behavior, posture and work patterns in a proper way during their working hours to reduce illness. The suggestion is corresponding to Zheng Yan and Ellahi in Table 11 (Zheng Yan, 2007; Ellahi, 2011).
2. The entity should define time for a break and make a campaign to exercise in every two working hours; it means to relax body muscles. The suggestion is corresponding to Anusit & Akinbinu in Table 11(Anusit, 2015; Akinbinu, 2013).

For reducing eyestrain, previous studies had an additional suggestion to adjust the light of the computer screen and warm eyelid massage (Zheng et al., 2007), besides checking eyes regularly (Akinbinu, 2013).

The suggestion for the future research as follows:

1. To study the developing potential risk to staff who use computer in their work.
2. To promote personnel participation with the university by studying their health effects from computer use and behaviour, with consideration of the body, mind, and society.

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