Indian Institute of Management Kozhikode

Working Paper

IIMK/WPS/171/HLA/2015/07

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Objective
To study the prevalence of computer-related health issues among white-collar employees; and to suggest an action plan.
Materials and Methods
A cross-sectional study of 4-month duration was conducted among white-collar employees from the Southern part of India with a sample size of 259.
Statistical Analysis Used
SPSS version 22 using the chi-square test.
Result
The prevalence of visual problems in the study group was 65% (168/259), and musculoskeletal problems were reported by 67% (173/259) while 32% (84/259) felt stressful symptoms. It was found that there was a gradual increase in visual complaints as the number of hours spent for working on computers daily increased and the same relation was found to be true for musculoskeletal problems as well.
Conclusion
Ocular discomfort, musculoskeletal problems and psycho-social problems form key category of computer-related health problems found among white-collar employees. The study has also brought into focus factors contributing to the occurrence of these problems. The study, based on literature review, has suggested an action plan to minimize the said problems and has emphasized the need to communicate the action plan time and again to the employees.
Application
Several studies on the topic have been conducted in the past. The action plan that needs to be communicated to the employees to tackle the computer-related health issues makes it unique. The information can be used by employers to develop a process and most importantly, will steer them in not only sensitizing the employees but also making alterations to the workplace to enhance employer branding.
Key Words
Health problems, white-collar employees, Standardized Nordic Questionnaire, action plan
Précis
The study discusses the prevalence of computer-related health issues among white-collar employees; and recommends an action plan based on the study results and a review of literature to tackle these and work effectively.

INTRODUCTION

The pinnacle of advancement in technology, the computer, has steered in a new field of occupational health problem, and these are better known as computer related health problems. If ignored, these problems can prove devastating and take a toll on physical and mental well being of employees. Lee (2003), conducted a study worldwide in an attempt to specifically determine the nature and extent to which health hazards may be present from prolonged exposure to computer. Various articles (2000 & 2003), have indicated that the computer related injuries cover a wide variety of health problems caused by or contributed by computer usage, which are all preventable (2003). The most common reported medical problems are eye strain, Carpal Tunnel Syndrome, neck and back strain, Conjunctivitis (itchy, bloodshot eyes) and Dermatitis (2005).

The increased use of computers in the workplace has brought about the development of a number of health concerns. Many individuals who work at a computer report a high level of job-related complaints and symptoms, including ocular discomfort, muscular strain and stress. Smith et al (1981) & DHHS (NIOSH) (1981) pointed out that the level of discomfort appears to increase with the amount of computer use. WHO (1986) clearly suggested that visual discomfort and related symptoms occurring in computer workers must be recognized as a growing health problem. The complex of eye and vision problems related to near work experienced during computer use has been termed "computer vision syndrome".

In the wake of the above, a study was conducted, the outcomes of which have been reproduced in this article.

MATERIALS AND METHODS

Study design and setting

A cross-sectional study of 4-month duration was conducted among white-collar employees from the Southern part of India. A sample size of 259 white collar employees from Southern India which included teachers/professors, doctors, engineers, lawyers, IT professionals, Finance & Accountancy Professionals amongst others.

Selection of participants

Random sampling was done and subjects were identified based on their profession – teachers, professors, lawyers, doctors, engineers, accountants, IT professionals and others.

Methods of measurement

Study subjects were administered four survey questionnaires after ensuring their privacy.

Data collection

Data was collected with the help of questionnaires. The first questionnaire included details about socio-demographic information as well as details regarding working hours, hours spent on computer at an average per week, any problems faced while working on computer, and the kind of problem faced.

A self-health assessment questionnaire for vision acuity was also administered for understanding the visual problems. Various tools were used as a part of the study like the standardized Nordic questionnaire was administered to assess musculoskeletal problems. Depression was measured by Zung's self-rating depression scale.

Statistical method

Data entry and statistical analysis were done using SPSS version 22. The chi-square test for testing the significance of association at *P* value of 0.05 and 0.01 was used to assess the association between socio-demographic parameters and visual/musculoskeletal/vision morbidities. Frequency distributions were calculated, Anova was conducted, and Factor analysis was done based on Zung's self-rating depression scale to identify which factors had more effect on the subjects.

RESULTS

The mean age of the study subjects was 34.6 with 37.8% of subjects being in the age group of 25-34 years and 28.2% in the age group of 35-44 years. 68% of the subjects were married while 31.7 % were unmarried. The female subjects constituted 42.1% of the total sample size while the male participants were 57.9%. From our example, we can see that Cronbach's alpha is 1.777**,** which indicates a high level of internal consistency for our scale with this specific sample (see table 1). Table 2 shows the gender-wise distribution of visual complaints. Number of hours spent

on the computer shows a difference in blurred vision, double vision, dry eyes, strain in the eyes, headache, altered Color perception, and watering of eyes (see table 3). Table 2 shows the gender-wise distribution of musculoskeletal problems.

EMPIRICAL ANALYSIS

Depression was present in 32% by Zung's self-rating scale. Factor analysis was done on the components of Zung's self-rating scale to study the effect of usage of computers on stress and depression. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed (see table 4). PCA was performed on the data and as a result, six components were identified (see table 5).

Eigen Value: It is the most commonly used index for determining how many factors to take from a factor analysis. The thumb rule says variables with Eigen value greater than one should be chosen. Thus in this study only those variables were considered where Eigen value was greater than 1.

Variance: The history of derived component is outlined by total variance explained value. Here the identified six components together account for 56.310% variance.

Scree Plot: This aids in deciding how many factors (or components) to select. It plots the Eigen values on the vertical axis and factor number on the horizontal axis. It shows a transition from large transition from large Eigen value to small value. In the current study the graph indicated clear six factor solutions.

Iterations: They help to specify the maximum number of steps the algorithm can take to perform the rotation. In the current study the number of iterations was seven.

Factor Analysis

Six factors were extracted. These are related to the stressful condition of the subjects. The factors are as follows:

Factor No. 1: Pessimism

It is the most important factor which explains 27.697% of the variation and this factor has nine significant variables such as we can see that feel downhearted (0.557), have crying spells (0.616), have trouble sleeping (0.642), am losing weight (0.516), feel constipated (0.640), heart beats faster (0.681), get tired for no reason (0.579), am restless (0.583), feel more irritable (0.533).

Factor No. 2: Optimism

This factor has four significant variables which account for 10.440% and the variables are: feel hopeful (0.492), easily make decisions (0.722), feel useful (0.759), still enjoy as usual (0.468).

Factor No. 3: Clarity of Thought

This factor has two significant variables which account for 6.208% and the variables are: have clear mind as usual (0.745), find it easy to do things (0.803).

Factor No. 4: Full of Energy

This factor has one significant variable which accounts for 6.044% and the variable is: feel best in morning (0.694).

Factor No. 5: Sense of Enjoyment

This factor has two significant variables which account for 5.761% and the variables are: eat as usual (0.694), still enjoy sex (0.708).

Factor No. 6: Cynicism

This factor has two significant variables which account for 5.143% and the variables are: life is pretty full (0.036), feel others would benefit if I were dead (0.843).

Factor – Demographic Relationship

By performing K – S test on the data (table 6), it was found that factors 2 (Optimism), 5 (Sense of Enjoyment), and 6 (Cynicism) are not normally distributed where factor 2 ($p = 0.041$, $p < 0.05$), factor 5 ($p = 0.026$, $p < 0.05$), and factor 6 ($p = 0.000$, $p < 0.05$). But factors 1 (Pessimism), 3 (Clarity of Thought), and 4 (Full of Energy) seem to be normally distributed where factor 1 ($p = 0.957$, $p > 0.05$), factor 3 ($p = 0.204$, $p > 0.05$), and factor 4 ($p = 0.053$, $p > 0.05$), which let us know that non-parametric tests have to be used for factors 2 (Optimism), 5 (Sense of Enjoyment), and 6 (Cynicism) and parametric test for factors 1 (Pessimism), 3 (Clarity of Thought), and 4 (Full of Energy).

Age group 1 (18-24) shows the maximum difference in factor 2 (Optimism), and factor 5 (Sense of Enjoyment). Age group 3 (35-44) shows maximum difference in factor 6 (Cynicism) (see table 7). Age does not show any difference on factors 1 (Pessimism: $p = 0.702$), 5 (Clarity of Thought: $p = 0.215$), and 6 (Full of Energy: $p = 0.245$) (see table 8).

Profession 4 (Engineer) shows the maximum difference in factor 2 (Optimism), Profession 7 (Others) shows the maximum difference in factor 5 (Sense of Enjoyment). Profession 6 (IT)

shows the maximum difference in factor 6 (Cynicism) (see table 9). Profession does not show any difference on factors 1 (Pessimism: $p = 0.128$), 5 (Clarity of Thought: $p = 0.122$), and 6 (Full of Energy: $p = 0.567$) (see table 10).

Marital Status shows significant difference on the three factors (Optimism, Sense of Enjoyment, and Cynicism). According to the mean rank, unmarried people show more difference in opinion on factors 2 (Optimism), and 5 (Sense of Enjoyment). However, married people convey more difference on factor 6 (Cynicism) (see table 11). Marital Status does not show any difference on factors 1 (Pessimism: $p = 0.512$), and 6 (Full of Energy: $p = 0.365$). However, it does show a difference on factor 5 (Clarity of Thought: $p = 0.034$) (see table 12).

Work experience 1(<5 years) shows the maximum difference in factor 2 (Optimism), 5 (>20 years) shows the maximum difference in factor 5 (Sense of Enjoyment). Work experience 4 (15-20 years) shows the maximum difference in factor 6 (Cynicism) (see table 13). Work experience does not show any difference on factors 1 (Pessimism: $p = 0.148$), 5 (Clarity of Thought: $p = 0.646$) and 6 (Full of Energy: $p = 0.976$) (see table 14).

Number of hours spent on the computer (more than 30 hours) shows the maximum difference in factor 2 (Optimism), and factor 5 (Sense of Enjoyment). Number of hours spent on the computer (up to 10 hours) shows the maximum difference in factor 6 (Cynicism) (see table 15). Number of hours spent on the computer does not show any difference on factors 1 (Pessimism: $p = 0.835$), 5 (Clarity of Thought: $p = 0.348$) and 6 (Full of Energy: $p = 0.334$) (see table 16).

DISCUSSION

Aaras et al (2000) & Bullock (1989) observed that the most familiar physical problems related to personal computer use are musculoskeletal disorders and eyestrains. The most common visual and musculoskeletal complaints cited by white-collar employees in the present study were: strain in eyes (40.5%) and pain/stiffness in neck (46.5%) respectively. In a study in Hong Kong bank professionals, most common cited musculoskeletal problem was pain in neck (31.4%) followed by back (30.6%). Neck was the most common site affected in almost all studies maybe because of the static posture which a person has to maintain while working on the computer. This also highlights that most of the people work for longer periods without taking recurrent relaxation.

According to studies conducted by Patel S et al (1991), Yaginuma Y et al (1990), and Tsubata K & Nakamori K (1993), the use of computers is associated with a decreased frequency of blinking and an increased rate of tear evaporation, each of which contributes to dry eyes. Studies conducted by Cook et al. (2000), & Marcus et al. (2002) indicate that several aspects of posture are significant because the individual is required to maintain one position for prolonged durations. "Muscles are often held in static, awkward, or extreme positions." These researchers, along with Amell & Kumar (2000) & Bergqvist et al. (1995) point out that "the head may be tilted, the arms abducted and unsupported, shoulders elevated, and wrists flexed and deviated from a neutral position." According to Wahlstrom (2005), "Frequent computer use is associated with an increase in musculoskeletal complaints of the neck/shoulder region as well as of the hands and arms."

The study results for visual and musculo-skeletal health problems are constant with the study conducted by Sharma *et al* ((2006). Headache encountered in our study was 29.2% which is concordant with an earlier study by Bhatt (2008).

Many individuals who work at a computer experience eye-related discomfort and/or visual problems. However, based on current evidence it is unlikely that the use of computers causes permanent changes or damage to the eyes or visual system (National Academy Press, 1983; Council on Scientific Affairs, American Medical Association, 1987; Cole et al. 1996; Mutti & Zadnik, 1996).

Studies have found that the majority of computer workers experience some eye or vision symptoms (Smith et al. 1981; DHHS (NIOSH), 1981; Dainiff et al. 1981; Staff et al. 1982; Rossignol et al. 1987; Collins et al. 1990). However, it is unclear whether these problems occur to a greater extent in computer workers than in workers in other highly visually demanding occupations. A national survey of doctors of optometry found that more than 14% of their patients present with eye or vision-related symptoms resulting from computer work (Sheedy, 1992). Salibello & Nilsen (1995) observed that the most common symptoms are eyestrain, headaches, blurred vision and neck or shoulder pain.

The relationship between computer-based work and the complaints of various sorts of stress and strain have been widely studied since the early 1980s. “Today, computers are used by nearly every working person even though there are differences in the mode and intensity of computer usage among the different professions and occupational groups,” stated Aarås et al., (2000) & Seppälä, (1995).

According to Smith & Sainfort (1989), “Stress and mental and physical well-being in computer-based office work seem to be connected in a complex way to individual factors and to various characteristics of the organization, technology, jobs, and employees. Features of the organization and work tasks are important mediating factors in the experience of stress in work with computers. Information technology is only one element associated with stress in organizational settings.”

CONCLUSION

It can thus be seen that ocular discomfort, musculoskeletal problems and psycho-social problems form key category of computer-related health problems found among white-collar employees. The study has also brought into focus factors contributing to the occurrence of these problems. The study, based on literature review, suggest an action plan to minimize the said problems and emphasizes the need to communicate the action plan time and again to the employees.

Towards An Action Plan

An article by Dudley (2005) states, “Most health authorities agree that all the muscular-skeletal disorders brought on by sitting for hours on end crouched over a keyboard - from sore fingers, wrists and arms to aching buttocks and a stiff neck - can be easily countered by taking short breaks throughout the working day.”

Research has shown that musculoskeletal symptoms can be minimized through ergonomics and education. A study by Henning et al. (1997) proves that frequent short breaks from computer work reduced musculoskeletal discomfort and other computer-related complaints among adults. A randomized trial conducted by Ketola et al. (2002) investigated “the impact of an intensive ergonomics approach and education on workstation changes and musculoskeletal disorders

among adult visual display unit users, and found that after two months, both the intensive ergonomics and the education groups had less musculoskeletal discomfort than the reference group".

Ripple (1952) & Sheedy (1995) opined, "The direction of gaze can also affect the eyes' focusing ability. Accommodative amplitude has been shown to be reduced with elevation of the eyes. The higher gaze angles at many computer workstations result in viewing conditions for which the amplitude of accommodation is reduced thus placing greater strain on the eyes' focusing mechanism. Also, as the direction of gaze moves downward, stress on the eye muscles is reduced. The eyes should be in a downward gaze of about 15 degrees when viewing a computer screen. As a result, the top of the screen should be below the horizontal eye level of the operator and tilted back slightly (10-20 degrees) away from the operator."

Jonathan (2005) pointed that "The staff involved in extensive use of computer keyboarding should be advised to condition themselves to take frequent very short breaks at short intervals and to use large font sizes and/or zooming function in order to correct the problems encountered while preventing themselves from further similar exposure risks. The screen should be kept 18-30 inches from one's eyes or about an arm's length." He added, "Letting wrists floating in the air is the best position or behavior of wrist while keyboarding."

Research results in articles (2005) have advocated that a low monitor to be more comfortable for eyes and neck. Computer Safety (2006) recommends that "the monitor be placed below the level of the head, and be tilted slightly upwards, so that the user gaze slightly downward, putting the neck in a more natural relaxed position."

Another research (2004) supports the idea of a much wider hip angle with about 130 degrees as an ideal angle. "When the hips are straightened, the vertebrae of the lower spine are aligned with each other in a way that reduces and evens out the pressure on the in-vertebral discs."

Recommendations

Based on the review of literature above, the following recommendations add value to this study. These recommendations offer valuable insights to computer users on the preventive measures to be taken while working with computers to safeguard from probable hazards. It is important to

educate the users on the potential health risks related with computer uses along with some preventive measures.

1. Workstation Illumination

A significant environmental factor affecting computer work is lighting. Bright lights in the bordering field of view may cause uneasiness and glare. Windows, overhead fluorescent lights and desk lamps add to this tricky situation. These bright light sources can be controlled with proper workstation and/or room design and arrangement. There should be a balance between the brightness of the screen and the room. Generally, windows are a cause of glare at many workplaces. It is advisable for those working with computers to avoid facing an unshaded window as the variance in brightness between the screen and the area behind it may be tremendously nerve-racking and full of discomfort. Sitting with back to an unshaded window might result in irritating shadows on the computer screen. A judicious use of shades, curtains or blinds can very well control light levels during the day.

2. Key Board, Mouse and Monitor

Improper use of keyboard and mouse may lead to musculo-skeletal problems. Appropriate typing habit is the key to prevent it. While using the keyboard, the computer user should keep the wrist straight and in line with the forearms almost parallel to the floor; using a trivial touch on the keyboard, rather than hammering on it. Moreover, the keyboard and mouse should be placed close together for an ideal posture while using the mouse. Besides, free movement of the hands on the keyboard ensures reduction in muscular stress. The mouse should be touched only when it is to be used. Constantly handling the mouse results in unnecessary strain on the wrist.

There should be enough distance from the monitor to ensure relaxed reading, and to avoid eyestrains. A preferable distance is 20 to 28 inches from the eyes. The monitor should be positioned in a way that its top be in the straight line of sight. This would help limit the need to tilt the head backward to see the screen, which in turn, would lead to a decrease in neck and shoulder muscles fatigue. Since the glare and reflection off the monitor may result in eye problems leading to blurred vision, it is advisable to use flat screens with appropriate setting of

brightness and contrast control. The use of appropriate font size on the screen and along with usage of the zooming facility help in putting the shoulder at ease.

3. Ergonomic Manners

The feet need be firmly placed on the floor, with the hip somewhat stretched and the knees retained at 60-90 degree angle and this requires a proper adjustment of the chair. The best solution id the use of modifiable chairs with the backrest 6 to 9 inches high and at least 12 inches wide for providing comfort while sitting. One needs to avoid sitting erect since that leads to less movement of the muscles in the lower back and results in the spine to support less weight.

4. General

Monitor, keyboard, and mouse need be placed in front of the user to prevent turning the head sideways, thereby ensuring the neck muscles are relaxed. Short breaks (15-30 seconds) at frequent intervals (10-20 minutes) promises to do wonders for the user. During these breaks, the hands be away the keyboard and arms be at the side. Altering the siting position and doing neck, head and shoulder exercises is recommended.

Other factors related to employee well-being reduce stress resulting from working with computers. These include: computer training, style of supervision, and employee motivating. Managerial methods like flexible working hours and selection of break time go a long way to boost the employee morale, thereby increasing their efficiency and a sense of ownership since these factors give them more control over their work. Employees working in shifts tend to benefit from this stress reduction technique.

LIMITATIONS

The study has some limitations that should be reflected upon while interpreting its findings. A higher number of respondents could better justify the analysis. The data used in the study comes from only one part of India (South), which may not allow generalization of the results to other regions of the country although the responses are from different job and personnel profiles. Better understanding of the computer-related health issues among white-collar employees would take place if the study is conducted across the country and better still if it is conducted across countries so that the cultural impact on the health issues could be scrutinized. Moreover, the

study is based on the results of the questionnaires administered to the white-collar employees. The research could get another dimension if the employers are also probed into regarding their perception and experience about computer-related health issues and the effect on their employees.

KEY POINTS

1. Ocular discomfort, musculoskeletal problems, and stress lead to an effect on the well-being of employees, thereby affecting productivity.
2. It is vital, therefore, to understand and identify the risks associated with the use of computers and take necessary precautions to mitigate the risks.
3. Taking prevention action in this regard promises to enhance employer branding and trust.

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Table 1: Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
1.777E-16	9.629E-17	6

Table 2:

Visual Complaints	**Male (%)**	**Female (%)**	**Total (%)**
Blurred Vision	13.1	11.6	24.7
Double Vision	2.3	2.3	4.6
Dry Eyes	10.8	5.4	16.2
Strain in eyes	22.8	17.8	40.5
Headache	19.7	19.7	39.4
Altered Color Perception	2.7	2.7	5.4
Watering of eyes	15.4	9.7	25.1
Musculo-skeletal Complaints			
Neck	23.6	22.9	46.5
Shoulders	21.4	19.4	40.7
Upper Back	19.4	14.3	33.7
Elbows	12.4	6.2	18.7
Lower Back	18.2	17.1	35.3
Wrist/Hands	10.9	5.5	16.3
Hips/Thighs	6.6	4.7	11.2
Knees	9.7	7.4	17.1
Ankles/Feet	6.2	6.2	12.4

Table 3:

Asymp.Sig (*p*)	Blurred Vision	Double Vision	Dry Eyes	Strain in eyes	Headache	Altered Color Perception	Watering of Eyes
	0.000	0.000	0.000	0.002	0.001	0.001	0.001

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	1066.655
	df	190
	Sig.	.000

Table 5: Details of PCA and SSL

PCA	Values	Components	SSL
Eigen Value	>1	C1	3.352
Variance	56.310	C2	2.094
Scree Plot	6 components	C3	1.724
Iterations	7	C4	1.471
		C5	1.422
		C6	1.199

Table 6: One-Sample Kolmogorov-Smirnov Test

	Pessimism	Optimism	Clarity of Thought	Full of Energy	Sense of Enjoyment	Cynicism
Kolmogorov-Smirnov Z	0.511	1.392	1.069	1.347	1.477	2.402
Asymp. Sig. (2-tailed)	0.957	0.041	0.204	0.053	0.026	0.000

Table 7: Kruskal-Wallis Test & Rank (Grouping Variable: Age Group)

	Age Group	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	18-24 years	41	157.82	11.087	4	0.026
	25-34 years	98	127.81			
	35-44 years	72	122.32			
	45-54 years	36	107.92			
	Above 55 years	11	156.64			
	Total	258				
Sense of Enjoyment	18-24 years	41	156.74	7.492	4	0.112
	25-34 years	98	125.02			
	35-44 years	72	119.26			
	45-54 years	36	127.44			
	Above 55 years	11	141.64			
	Total	258				
Cynicism	18-24 years	41	115.35	3.299	4	0.509
	25-34 years	98	125.48			
	35-44 years	72	139.50			
	45-54 years	36	135.22			
	Above 55 years	11	133.82			
	Total	258				

Table 8: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	2.200	4	.550	.546	.702
	Within Groups	254.800	253	1.007		
	Total	257.000	257			
Clarity of Thought	Between Groups	5.803	4	1.451	1.461	.215
	Within Groups	251.197	253	.993		
	Total	257.000	257			
Full of Energy	Between Groups	5.443	4	1.361	1.368	.245
	Within Groups	251.557	253	.994		
	Total	257.000	257			

Table 9: Kruskal-Wallis Test & Rank (Grouping Variable: Profession)

	Profession	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Teaching	66	130.98	6.262	6	0.395
	Medical	14	115.32			
	Legal	30	123.50			
	Engineer	29	152.17			
	Finance & Ac.	24	134.48			
	IT	34	139.78			
	Others	61	115.63			
	Total	258				

Sense of Enjoyment	Teaching	66	128.42	8.071	6	0.233
	Medical	14	134.32			
	Legal	30	125.57			
	Engineer	29	123.97			
	Finance & Ac.	24	95.85			
	IT	34	132.81			
	Others	61	145.52			
	Total	258				
Cynicism	Teaching	66	141.88	25.561	6	0.000
	Medical	14	147.46			
	Legal	30	135.57			
	Engineer	29	126.69			
	Finance & Ac.	24	87.48			
	IT	34	167.57			
	Others	61	105.65			
	Total	258				

Table 10: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	9.882	6	1.647	1.673	.128
	Within Groups	247.118	251	.985		
	Total	257.000	257			
Clarity of Thought	Between Groups	10.030	6	1.672	1.699	.122
	Within Groups	246.970	251	.984		
	Total	257.000	257			
Full of Energy	Between Groups	4.852	6	.809	.805	.567
	Within Groups	252.148	251	1.005		
	Total	257.000	257			

Table 11: Kruskal-Wallis Test & Rank (Grouping Variable: Marital Status)

	Marital Status	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Married Unmarried Total	175 82 257	124.15 139.36	2.339	1	0.126
Sense of Enjoyment	Married Unmarried Total	175 82 257	120.45 147.24	7.249	1	0.007
Cynicism	Married Unmarried Total	175 82 257	132.17 122.24	0.997	1	0.318

Table 12: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	1.345	2	.672	.671	.512
	Within Groups	255.655	255	1.003		
	Total	257.000	257			
Clarity of Thought	Between Groups	6.723	2	3.362	3.425	.034
	Within Groups	250.277	255	.981		
	Total	257.000	257			
Full of Energy	Between Groups	2.023	2	1.012	1.012	.365
	Within Groups	254.977	255	1.000		
	Total	257.000	257			

Table 13: Kruskal-Wallis Test & Rank (Grouping Variable: Work Experience)

	Work Experience	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	<5 years	83	142.59	8.216	4	0.084
	5-10 years	70	130.70			
	10-15 years	40	125.55			
	15-20 years	31	100.48			
	>20 years	32	117.97			
	Total	256				
Sense of Enjoyment	<5 years	83	138.73	6.422	4	0.170
	5-10 years	70	116.04			
	10-15 years	40	119.28			
	15-20 years	31	122.03			
	>20 years	32	147.00			
	Total	256				
Cynicism	<5 years	83	125.23	6.627	4	0.157
	5-10 years	70	114.79			
	10-15 years	40	130.08			
	15-20 years	31	149.94			
	>20 years	32	144.25			
	Total	256				

Table 14: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	9.467	6	1.578	1.600	.148
	Within Groups	247.533	251	.986		
	Total	257.000	257			
Clarity of	Between Groups	4.259	6	.710	.705	.646

Thought	Within Groups	252.741	251	1.007		
	Total	257.000	257			
Full of Energy	Between Groups	1.243	6	.207	.203	.976
	Within Groups	255.757	251	1.019		
	Total	257.000	257			

Table 15: Kruskal-Wallis Test & Rank (Grouping Variable: Hours on Computer)

	Hours on Computer (Average per Week)	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Up to 10 hours	42	124.07	1.636	3	0.651
	10-20 hours	85	125.85			
	20-30 hours	52	126.36			
	More than 30 hours	79	138.38			
	Total	258				
Sense of Enjoyment	Up to 10 hours	42	131.90	8.515	3	0.036
	10-20 hours	85	131.59			
	20-30 hours	52	104.22			
	More than 30 hours	79	142.61			
	Total	258				
Cynicism	Up to 10 hours	42	139.71	3.745	3	0.290
	10-20 hours	85	117.96			
	20-30 hours	52	127.99			
	More than 30 hours	79	137.48			
	Total	258				

Table 16: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	.867	3	.289	.287	.835
	Within Groups	256.133	254	1.008		
	Total	257.000	257			
Clarity of Thought	Between Groups	3.309	3	1.103	1.104	.348
	Within Groups	253.691	254	.999		
	Total	257.000	257			
Full of Energy	Between Groups	3.411	3	1.137	1.139	.334
	Within Groups	253.589	254	.998		
	Total	257.000	257			

Indian Institute of Management Kozhikode

*Type of Document: (***Working Paper/Case/ Teaching Note, etc.)**	*Ref. No.: (to be filled by RCP office)*
Working Paper	**IIMK/WPS/171/HLA/2015/07**

Title:

COMPUTER-RELATED HEALTH ISSUES AMONG WHITE-COLLAR EMPLOYEES: COMMUNICATING AN ACTION PLAN

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Subject Areas **:**	*Subject Classification Codes, if any:*
Managerial Communication, Soft Skills, Health Communication	
Supporting Agencies, if any: *NA*	*Research Grant/Project No.(s):* **SGRP/2012/54**
Supplementary Information, if any: *NA*	*Date of Issue: (to be filled by RCP office)* Febrary 2015
Full text or only abstract to be uploaded on website: (please choose one) ***Full text***	*Number of Pages: 25*

Abstract:

Objective: *To study the prevalence of computer-related health issues among white-collar employees; and to suggest an action plan.*

Materials and Methods: *A cross-sectional study of 4-month duration was conducted among white-collar employees from the Southern part of India with a sample size of 259.*

Statistical Analysis Used: *SPSS version 22 using the chi-square test.*

Result: *The prevalence of visual problems in the study group was 65% (168/259), and musculoskeletal problems were reported by 67% (173/259) while 32% (84/259) felt stressful symptoms. It was found that there was a gradual increase in visual complaints as the number of hours spent for working on computers daily increased and the same relation was found to be true for musculoskeletal problems as well.*

Conclusion: *Ocular discomfort, musculoskeletal problems and psycho-social problems form key category of computer-related health problems found among white-collar employees. The study has also brought into focus factors contributing to the occurrence of these problems. The study, based on literature review, has suggested an action plan to minimize the said problems and has emphasized the need to communicate the action plan time and again to the employees.*

Key Words/Phrases: *Health problems, white-collar employees, Standardized Nordic Questionnaire, action plan*

Referencing Style Followed: ***APA***

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