CASE STUDY

Results of the Study to Evaluate Optimal Office™

At the City of Fort Collins, Colorado, USA | October 2004 – May 2005

Logisens Corp., Colorado, conducted a case study at offices of the City of Fort Collins. The workplaces were mostly in cubical environments. They were located in the departments for Utilities, Finance, IT, Risk Management, Utilities Billing and Parks and Recreation. The objective was to test the *Stressmanager* [Optimal Office] in PC workplaces in order to evaluate its usefulness and effects. For a description of the device and the program see the appendix.

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PSYCHOLOGICAL MEASURES, STUDY DESIGN

A test group of users of the *Stressmanager* [Optimal Office] was chosen from volunteers. The test group, which was given the Stressmanager, had 23 members. They worked at computer workplaces in an office environment, at least 5 of 8 hours at the computer, in tasks requiring at least occasional use of the mouse. 20 of the members were female, 3 male.

In October 2004 the *Stressmanager* [Optimal Office] was installed at the workplaces of the test group members. A one-hour introduction and training for the *Stressmanager* [Optimal Office] device and program were conducted as well as the first questionnaire assessment. The next rounds of questionnaires were given in December 2004, February 2005 and May 2005.

Data from the study questionnaires

Three topics were tested: Burnout, work stress, life and job satisfaction. The following questions were used. Every question had a scale on which users had to circle one of the answers:

Burnout

21 questions on a scale from 1 to 7, (from Pines A, Aronson E, Kafry D. Burnout: From tedium to personal growth. New York: Free Press, 1981)

How often do you have any of the following experiences in terms of your work? (in the last 4 to 6 weeks). Please use the scale.

1. Being tired
2. Feeling depressed
3. Having a good day
4. Being physically exhausted
5. Being emotionally exhausted
6. Being happy
7. Being “wiped out”
8. Feeling “burned out”
9. Being unhappy
10. Feeling rundown
11. Feeling trapped
12. Feeling worthless
13. Being weary
14. Being troubled
15. Feeling disillusioned and resentful about people
16. Feeling weak and helpless
17. Feeling hopeless
18. Feeling rejected
19. Feeling optimistic
20. Feeling energetic
21. Feeling anxious

Work stress

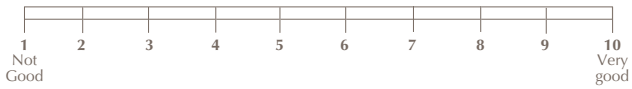
Seven questions on a scale from 1 to 7, (Job Characteristic Questionnaire from: Etzion D. Moderating effect of social support on the stress-burnout relationship. J Appl. Psychol. 1984; 69:615-622)

In my work (in the last 4 to 6 weeks)

1. I feel overloaded
2. I experience competitiveness
3. I feel not worthy
4. I have difficulties in decision making
5. I have impossible duties and responsibilities
6. I feel overextended in terms of deadlines and obligations
7. I have conflicting demands

Life and job satisfaction

Three questions on a scale from 1 to 10, (from Strauss-Blasche, G., University of Vienna, 2003)



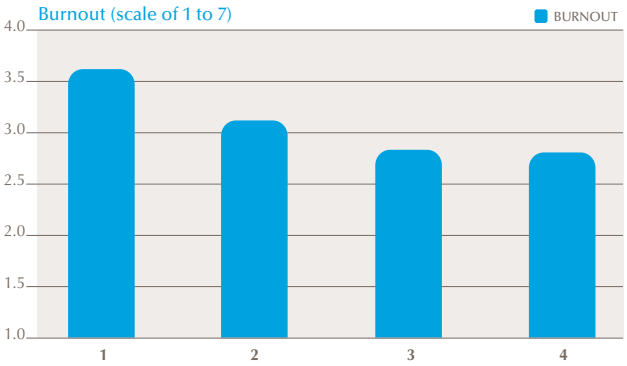
Rate on the scale your current

1. Life satisfaction
2. Job satisfaction
3. Well being

PSYCHOLOGICAL MEASURES, RESULTS OVERVIEW

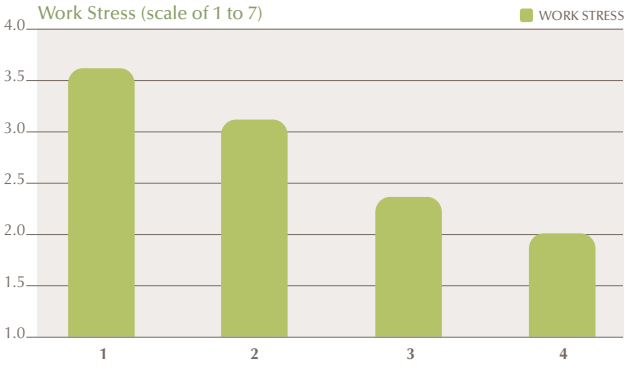
Burnout

The test group shows a decrease of the burn out rate of 22.4% when compared to itself, starting with the first data point.



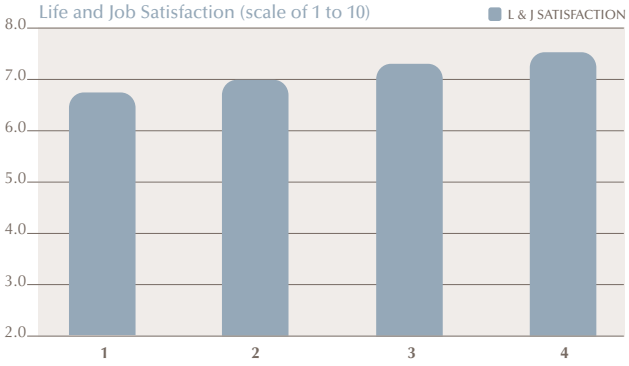
Work stress

The test group shows a decrease of the subjective work stress feeling of 44% when compared to itself, starting with the first data point.



Life and job satisfaction

The test group shows an increase in overall life and job satisfaction of 15% when compared to itself, starting with the first data point.



PSYCHOLOGICAL MEASURES, DETAILED RESULTS

Overview results have been calculated using the *median* methodology. This means the individual results, which have been calculated as averages, have been sorted and the middle most value has been taken. This eliminates upper and lower extreme results and shows the behavior of the whole group.

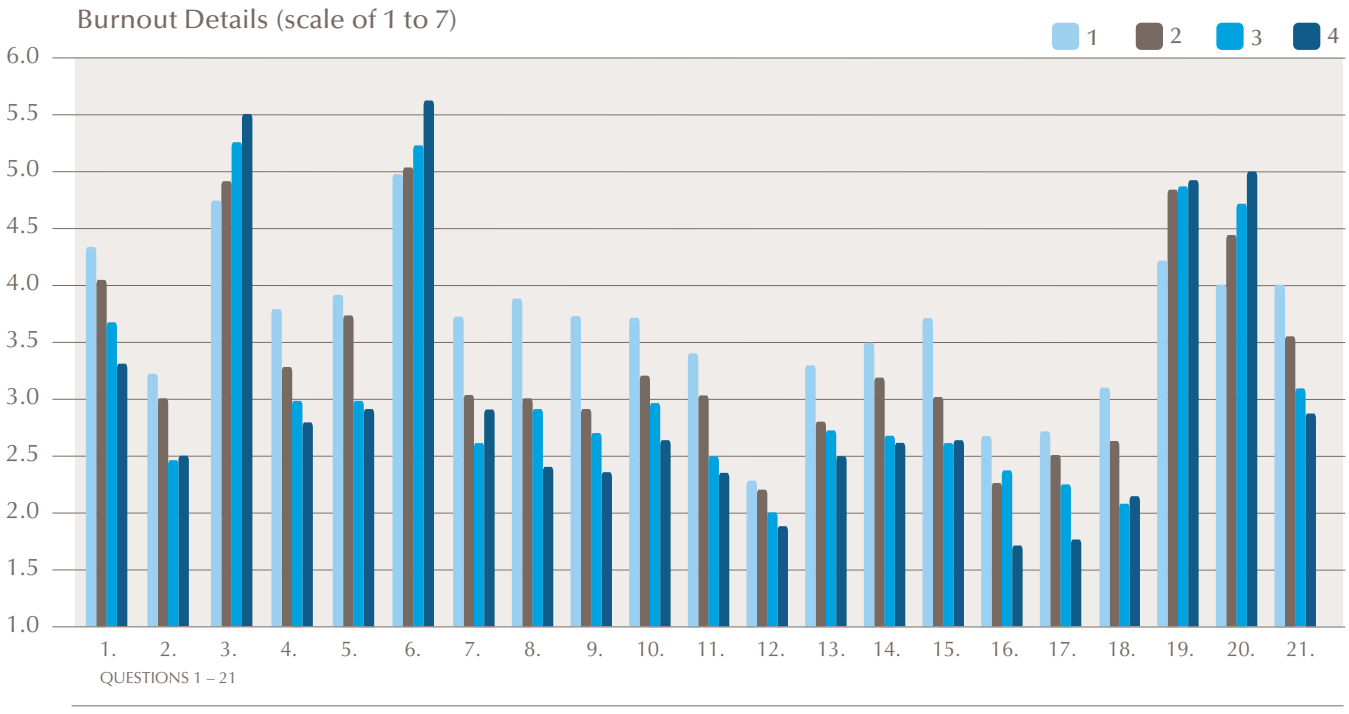
Detailed results have all been calculated using the *average* methodology. This is because the individual questions could only be answered with a resolution of 7 and 10 steps respectively. A sorting algorithm such as the median gives as results only values with a granularity of 1 (no in between results like 3.78), which is not meaningful here. As a result the detailed results are slightly different from the overview results.

Burnout

The 21 questions have been analyzed each for their trend over the 7 month of the case study. Questions 3, 6, 19 and 20 are asking for "positive" experiences and have the (expected) inverse trend to the other questions. The labels 1, 2, 3 and 4 for each question are the times, when the questionnaires have been conducted.

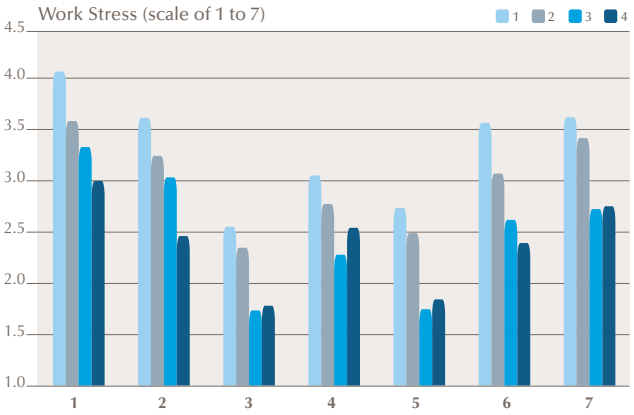
Dates:	10/04	12/04	2/05	5/05	
Questions					**Percentage Improvement**
1. tired	4.783	4.043	3.700	3.267	**31.7%**
2. depressed	3.261	2.957	2.400	2.467	24.4
3. good day	4.783	4.891	5.250	5.467	14.3
4. physic. Exh.	3.783	3.250	2.950	2.800	26.0
5. emot. Exh.	3.913	3.722	2.975	2.933	25.0
6. happy	4.957	5.043	5.250	5.667	14.3
7. wiped out	3.696	3.078	2.550	2.867	22.4
8. burned out	3.826	2.978	2.900	2.333	**39.0**
9. unhappy	3.522	2.826	2.650	2.333	**33.7**
10. rundown	4.000	3.174	2.950	2.667	**33.3**
11. trapped	3.391	2.522	2.500	2.333	**31.2**
12. worthless	2.261	2.130	1.950	1.867	17.4
13. weary	3.261	2.826	2.775	2.467	24.4
14. troubled	3.478	3.130	2.750	2.667	23.3
15. disill.resentful	3.478	3.000	2.650	2.667	23.3
16. weak	2.609	2.217	2.300	1.800	**31.0**
17. hopeless	2.696	2.478	2.200	1.800	**33.2**
18. rejected	3.043	2.609	2.050	2.133	**29.9**
19. optimistic	4.304	4.826	4.850	4.933	14.6
20. energetic	4.043	4.435	4.700	5.000	23.7
21. anxious	4.000	3.565	3.125	2.867	28.3

The group improved most at being less tired, burnt out, unhappy, run down, trapped, weak, hopeless and rejected with a decrease of more than 30% each.



Work Stress

The 7 questions have been analyzed individually for their trend over the 7 month of the case study. The labels 1, 2, 3 and 4 for each question are the times, when the questionnaires have been conducted.



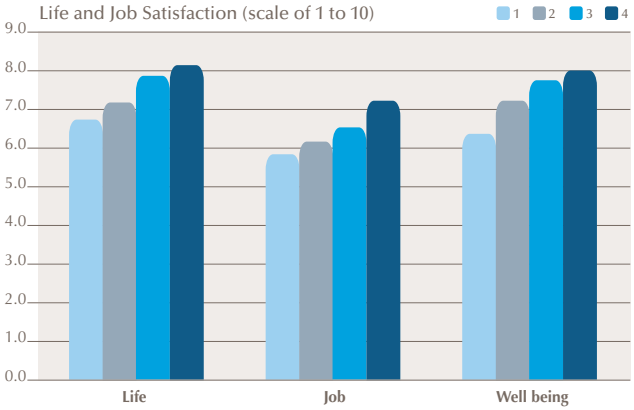
Dates:	10/04	12/04	2/05	5/05	
Questions					**Percentage Improvement**
1. overloaded	4.087	3.565	3.350	3.000	26.6%
2. competitive	3.609	3.217	3.050	2.467	31.6
3. not worthy	2.522	2.348	1.750	1.800	28.6
4. difficult dec. making	3.043	2.783	2.250	2.533	16.8
5. impossible duties	2.696	2.478	1.800	1.933	28.3
6. deadlines, obligations	3.565	3.043	2.600	2.400	**32.7**
7. conflicting demands	4.000	3.391	2.750	2.800	**30.0**

The group improved most at dealing with feelings of competitiveness, deadlines and obligations and conflicting demands with more than 30% each, the least in difficulties in decision making.

Life and Job Satisfaction

Women and Men together

The 3 questions have been analyzed individually for their trend over the 7 month of the case study. The labels 1, 2, 3 and 4 for each question are the times, when the questionnaires have been conducted.

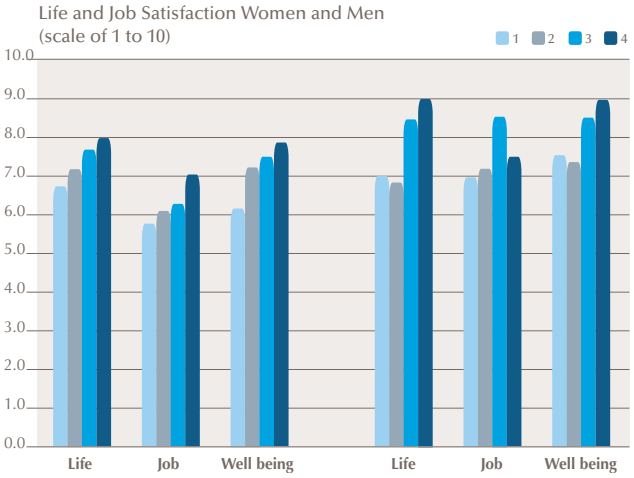


Dates:	10/04	12/04	2/05	5/05	
Areas of Satisfaction					**Percentage Improvement**
Life	6.717	7.174	7.700	8.133	**17.4%**
Job	5.826	6.087	6.550	7.133	**18.3**
Well being	6.478	7.261	7.650	8.000	**19.0**

All three areas of satisfaction improved quite similarly with job satisfaction having generally the lowest score.

Women and Men separated

When separated, the data for women and men showed some differences. With 20 women and only 3 men in the study, the statistical significance, therefore, is higher in the women's group.



Life &Job Satisfaction Women

Dates:	10/04	12/04	2/05	5/05	Improvement in %
Life	6.68	7.25	7.61	8.00	16.6
Job	5.65	6.10	6.33	7.08	20.2
Well being	6.30	7.25	7.56	7.85	19.7

Life &Job Satisfaction Men

Dates:	10/04	12/04	2/05	5/05	Improvement in %
Life	7.00	6.67	8.50	9.00	22.2
Job	7.00	6.00	8.50	7.50	6.7
Well being	7.67	7.33	8.50	9.00	14.8

For women job satisfaction increased the most, followed by well being. For men, life satisfaction increased the most.

COMPARISON WITH CASE STUDY IN WISCONSIN

The results in the City of Fort Collins are quite similar to those of a case study conducted in 2004 in Wisconsin. Both studies were about the same time length (7 and 6 months). In Wisconsin, productivity could be measured as well, which showed an increase of about 9% leading to an ROI of 1,100% for the device and service.

	Fort Collins (7 months)	Wisconsin (6 months)
Burnout	22.4%	22%
Work stress	44%	38%
Life and job satisfaction	15%	6 to 12 %
Productivity/ROI	Not measured	9%, ROI 1,100%

APPENDIX

Description of the Stressmanager [Optimal Office] V 1.3

The *Stressmanager* [Optimal Office] consists of a special computer mouse and software for the PC. The mouse works like a standard PC-mouse and in addition has sensors, which register physical data.[1] These readings are displayed as they occur on the PC, whenever the hand grips the mouse and uses it normally.

Display Options

The software program generates a direct feedback with the measured data and teaches popular, basic skills of stress management over time. It incorporates inconspicuous stress level indicators and scheduled stress reduction trainings. A slender bar on the side of the screen, a tiny icon or a number can be selected to display the user's stress level and its trend whenever the mouse is in use. These guides make the user aware of stress objectively.

Trainings

When a threshold of stress is reached, a cue alerts the user. A short training such as three deep breaths or a brief stretching session is offered. The user is prompted to release stress as it arises, thus preventing its accumulation and associated ill-effects.

The training program includes a scheduler that brings up guided relaxation sessions two or three times each day. The total training time is 6 to 10 minutes a day.

The trainings enable the user to cope with stress at the workplace, while remaining seated at the workstation. They are designed as short breaks within the workflow, to release stress in the body for a fresh start. Training options include guided breathing exercises, stretching, viewing relaxing picture series, biofeedback, and a biofeedback soccer game.

Review

A review shows the stored data, notes and time markers from a workday to evaluate the progress in stress management. Privacy is ensured by a password.

[1] It measures the skin conductance level, a physiological measure reflecting the level of stress.

Description of the target PC-Systems

- Windows 98SE onwards
- 800x600 screen minimum
- 1 free, available 9pin serial port for the biofeedback data to be received
- PS/2 port for the 2 button 1 wheel mouse with a standard driver
- Multimedia is used for the stress management. Ideally the PCs has a sound card and speakers or headphones to play wave-files. The program needs working codecs for .avi and .wav.
- A local C:\ hard disk with 50+ MB free storage room. The program is copied into a folder, so a CD-Rom drive or a network to copy it and for service (data access for the study) is needed. The program starts from the autostart folder and has a desktop icon, it is strictly local, not needing a network to run.
- Ideally users have a local email program through which they can access the support.

Description of the Sensor Mouse Device

The equipment consists of a mouse with 2 buttons and one wheel with stress monitoring sensors, a box in the mouse cable for the circuitry and 2 cables to be plugged into the PC.