Stress at the workplace is reflected in the biological rhythms of the human body. The HUMAN RESEARCH Institute has developed special methods for displaying the body’s stress and recovery phases during the day and at night. These phases are represented in the form of impressive images of the body’s rhythms. Various typical stress situations were examined and compared in a study of forestry workers.

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Changes in the working environment

Due to increasing mechanisation, working conditions in the forestry and timber industries have changed dramatically in recent years. Harvesters – modern tree harvesting machines – are replacing hand-held chain saws in many forestry operations. This increasing mechanisation of work systems has also brought about changes in the demands which are made on forestry workers. Generally speaking, there has been a reduction in the physical demands of the work. On the other hand, there has been a marked increase in mental stress.

Gathering data from ECGs and questionnaires

Our study examined the ways in which job-specific conditions such as the steepness of the terrain in which they work and overnight accommodation affect the stress and recovery levels of forestry workers. In addition, we studied the effects of organisational and financial responsibilities held by some of the workers in the study and of different types of forestry equipment. The relevant psychological and physiological data was gathered over a continuous 25-hour period using a high-resolution, single-channel ECG monitor to determine heart rate variability. Heart rate is an important indicator of the body’s ability to deal with stress – higher values enable the autonomic system to adapt better to day-to-day demands. In addition to having repeated ECG recordings taken, participants also completed standardised questionnaires. A total of 20 harvester drivers participated in the study.

Monotonous work as a stress factor

The ECG recordings showed that autonomic recovery phases at night were noticeably less pronounced after forestry work in largely flat terrain than when the workers had been on sloping ground. This finding was reinforced by a companion study in industrial psychology, which found that harvester drivers were generally more irritable and less relaxed when working on flat terrain. These results show the negative effects of monotonous working conditions in flat terrain.
Improved regeneration in familiar surroundings

Stress levels are also significantly affected by the place where forestry workers can relax after the demands of the day’s work. For example, the study showed that harvester drivers who went home only at weekends had a lower heart rate variability. This finding suggests that weekend commuters are exposed to higher psychological and physiological demands and benefit significantly less from protective factors – such as a familiar sleeping environment, social support from their families, etc. – than day commuters.

Responsibility helps

Participants in the study who were responsible for financial and organisational matters had significantly better autonomic recovery rates at night. While the harvester drivers’ own evaluation of their sleeping patterns showed that they were not subjectively aware of this, the psychological study – together with the good physiological readings – clearly showed an improved overall state in those harvester drivers who had additional responsibilities.

Lack of regular breaks

As part of the study, all participants kept detailed activity logs, which were then subjected to comparative examination. The data showed that all participants slept and worked with the harvesters at roughly the same times. In contrast, there was very little correspondence in the times at which they ate their meals and took breaks from work. A well-regulated schedule of breaks, however, is a vital precondition for physical and psychological regeneration.

Types of equipment

Compared to drivers of wheeled harvesters in the study, drivers of tracked harvesters exhibited a higher heart rate variability, i.e. their autonomic systems adapted better to the requirements of their work. These findings correspond to the forestry workers’ subjective evaluations of their sleep quality. Drivers of tracked harvesters reported a markedly better sleep quality than drivers of wheeled harvesters. However, because of the small number of cases in the study, it is too soon to draw general conclusions about the influence of the different vehicle types.

Temporal correspondence of all activities of the participants
Heart rate at night is markedly higher after working in flat (monotonous) terrain.

Day commuters show higher activation rates in the morning than weekend commuters.

Optimum vegetative parameters at night in harvester drivers with extra responsibilities.

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