Occupational stress index questionnaire pdf

PROFESSIONAL STRESS INDICE: INTRODUCTION By Dr. Karen Belkic August 2000 A BRIEF BACKROUND The Occupational Stress Index (OSI) is an additive load model that focuses on work stressors relevant to the cardiovascular system (Belkic, 1995). The OSI incorporates elements of the employment tension model (Karasek, 1979), as well as other formulations of how stress leads to cardiovascular disease, such as occupational characteristics in high-risk occupations. However, unlike constructs such as Job Strain (Ibid.) and Effort-RewardBalance (Siegrist, 1991, 1996), which are strongly based on sociological theory, OSI derives more from cognitive ergonomics and brain research, trying to describe, in quantitative terms, the burden of human work processes. The underlying motivation to develop such an approach is to help identify areas of intervention, striving to reflect actual work experiences. There have been two important approaches in professional psychosocial research using self-account methods. One of them was to develop issues specific to the occupation. This can provide rich and detailed information useful for identifying key areas of intervention. However, these employment-specific questionnaires generally cannot measure stressors at work in various occupations. The other approach was to measure the generic characteristics of employment using general questions. However, this approach is less useful for intervention studies because the questions are more 'distant from actual work experiences' (Landsbergis, 2000). The OSI represents a potential way to link these two divergent approaches. As Landsbergis and Theorell (Ibid) put it: A recent innovative approach has used profession-specific issues (useful for workplace interventions), which are based on general issues. The Occupational Stress Index (OSI) can be adapted to specific occupations, allowing them to compare the stress burden faced by workers between occupations (p. 164). We can make comparisons with respect to the total burden, as well as the nature of the burden of work stress. These issues are of interest not only to the research community, but also to those raised by the workers themselves. Figure 1 Occupational Stress Index Information Transmission Levels Underload Strong Demand Extrinsic Time Pressure Aversiveness (Harmful Exposures) Avoidance (Symbolic Reversivity) Conflict /Uncertainty Entry - Consistent Incoming Signals - Low Frequency of Incoming Signals - Works Alone - Several Sources of Information Simultaneous tracking -Hetregenous Signals - Primary Visual Modality - High Frequency of Incoming Signals - Three Sensory Modalities - Essential Communication for Work - Strict Requirements for Signal Detection - No Control on The Speed of Incoming Signals - Glare - High Level of Attention (Serious Consequences of Momentary Failure - Signal/ Sound Conflict Complicated Decisions - Complicated Decisions - Decisions Affect The Work of Others Need for Quick Decision Making - Limited Number of Decision-Making Strategies - Limited Number of Correct Decisions - Decision Cannot Be Postponed - Bad Decision Can Have Serious Consequences (Potential Missing Information Needed for Decision - Conflicting Information - Unexpected Events Change Work Plan Exit/Execution of Tasks - Simple Tasks - Nothing to Do - Heterogeneous Tasks - Simultaneous Task Execution - Complex Tasks - Need for Quick Task Execution - Work Must respond to a strictly defined standard task 'No control over the rate of task performance 'Vibration 'Isometric Stress 'Dangerous tasks ' Conflicting tasks in space and time ' External factors hinder the performance of tasks General 'Fixed salary ' Work rate of Overtime 'Holds 2' Works ' Lack of Rest Breaks ' Night Work ' Fixed Body Position ' Work in Confined Space 'Accelerate' Deadline Pressure 'Temperature' Heat ' Harmful Gas/Smoke/Dust ' Work Accident ' Accident Control Work - Emotional Work (interpersonal disorders): Belkic K, Savic C, Theorell T, et al. Mechanisms of cardiac risk in professional drivers. Scan J Work About Health. 20:73-86, 1994. OSI Information Transmission Levels As shown in the figure (1), the OSI is arranged in a two-dimensional matrix, with the vertical axis consisting of information transmission levels: 1) Sensory input 2) Central decision-making 3) Central effector output (task performance) These are basic cognitive ergonomic processes, as described by Welford (1960), which can be mapped over time using neurophysiological methods (Ivanitsky 1980). These provide a useful format for categorizing a wide range of professional efforts. Luczak (1971), e.g., used this formulation in work simulation analysis. We have added a general level for items that are related to the overall work environment and that are not localized to a specific level of information transmission. Stress Dimensions The dimensions or aspects of the stress of the OSI are placed along the horizontal axis, as follows: 1) Underload 2) Strong demand 3) Restriction 4) Extrinsic time pressure 5) Aversive/harmful exposures 6) Vigilance/disaster 7) Conflict/uncertainty The two-dimensional matrix Thus, each factor has a set of coordinates, locating it at the type of stress and at which it affects humans. Summaries by levels and aspects of stress can be made, and a wide variety of combined effects can be evaluated. The sum of the factor scores includes the total score of the OSI, which is attempt to quantify the overall burden on the human operator of a given set of working conditions. As mentioned above, comparisons between OSI groups on total burden can be used. We can also understand the nature of the burden of occupational stress. For example, it may turn out that two very different jobs, such as teaching work and an assembly line have total scores similar to the OSI. The OSI would help to elucidate the difference between these two jobs. As we will see later, teachers have a very high demand on the levels of input and central decision-making, as well as various degrees of extrinsic time pressure and conflict. On the other hand, factory workers are subjected to underloading (short-cycle and monotonous work), as well as very strict constraints on the speed and content of the work they do. The OSI can provide a detailed profile of relatively fixed stressors, as well as potentially modifiable workplace stressors of a given job, by identifying the level at which the burden occurs primarily and the main contributory dimensions. This information helps determine where changes in work environments would be most beneficial. Preventable Threat Vigilance-An often hidden but important stress dimension, an in-depth discussion of each of the dimensions of the OSI with respect to other models of psychosocial work stress, cognitive ergonomics, and cardiac risk can be found in (Belkic 1995(a), Belkic 2000(a)). However, the stress dimension #6 warrants feedback at this stage, because it is often excluded from psychosocial stress patterns at work, yet is, in our view, an extremely important, if often unrecognized, stressor at work. We emphasize that when the potential consequences of its actions may include a disaster, work can become a vigilant activity that avoids the threat. To the extent that one anticipates the possibility of encountering damage of some kind, this is inevitably associated with negative emotions (Lazarus, 1967). There are epidemiological data, humans in the laboratory and on experimental animals that directly and indirectly link prolonged exposure to vigilant activity that avoids the threat of adverse cardiovascular effects, including cardiac electrical instability and even sudden cardiac death (Corley, 1977, Lown, 1990, Menotti, 1985, Murphy 1991, Suurnakki 1987, Theorell, 1993). Professional drivers, marine pilots, air traffic controllers and other categories of control panel workers, all of whom perform primarily vigilant activities that avoid the threat, are at high risk of hypertension and/or ischemic heart disease (Winkleby 1988, Belkic 1998, Ragland 1997, Cobb 1973, Erikssen 1981, Tuchsen 2000). Cognitive ergonomics and brain research illustrate that the greatest burden on conscious attentional resources occurs when one continually follows a barrage of signals to which it must be ready to react quickly, so that momentary error, or delay could have serious or even fatal consequences (Belkic 1992(a), Kalsbeek 1974, Levi 1981, Parasuraman 1984, Stroh 1971). For survival reasons, our nervous systems are designed to selectively allocate mental resources to threatening stimuli, even if the threat is only symbolic in nature. A salient illustration of the importance of this hidden burden on conscious attentional resources is seen in a study of the human human electrocortical brain in a simulated traffic situation. At that time, exceptionally high selective attention was achieved when people were confronted with an impending traffic accident scene (Martin, 1992). This study also showed that the compensatory allowance (particularly the increase in time allocation) is essential in such situations. This has to be calculated in the work planning equation. Description of OSI questionnaires The occupational stress index is based on questionnaires and does not require on-the-job analysis. To the extent that they are available, direct measurements and data from the work site can be effectively integrated into the OSI and improve their accuracy. Each element of the ISI is rated on a scale of 0 to 2, with zero being not present and 2 as strongly present. General OSI General Questionnaire The general OSI questionnaire applies to workers of any professional profile. This issue has been applied to 345 workers in both occupations and genders in several countries (Belkic 1995 a), 1996). In our experience, the general OSI has good in-person validity, as workers consider issues relevant to their daily lives at work, and that they understand even the slightly more abstract issues very well. The internal coherence of the total general OSI lies within the desired range (Cronbach alpha - 0.81), as are most, but not all scales. (The two scales of the general OSI, in which the internal coherence is low are: Extrinsic time pressure and Rigueur. For more details, see Belkic 1995(b), as well as Landsbergis 2000) The general OSI questionnaire can be used for comparisons between occupations, particularly when assessing a heterogeneous labour force with a wide range of profiles. However, as mentioned above, the general questionnaires have a common weakness in their distance from actual work experiences. The general OSI is no exception. On the other hand, the general OSI, having been designed to focus on the objective characteristics of the work, can serve as a bridge to the next step in the application of the OSI. In other case, the general OSI data of several workers in the same occupation can be used as the first phase of the development of an occupation-specific questionnaire, which can then be piloted. The qualitative data of workers who wish to devote additional time to comment and explain their responses to the General OSI in relation to their actual work environment are invaluable. This process is facilitated by a number of open-ended questions included at the end of the questionnaire. Expert observers can also be of great importance Occupation-specific OSI Questionnaires Our goal with the OSI has been to develop a series of profession-specific questionnaires, all of which are part of the OSI 'umbrella'. In other words, all of this would be compatible with the general OSI and would allow comparisons between professions, but they would be much more operational and streamlined. Namely, these are derived from one of a based on a detailed knowledge of the profession in question. Once developed, these occupation-specific ISOs allow us to omit questions about the fixed aspects of a given line of work and focus on the variable characteristics of a given occupation, and often identify key stressors that could be addressed. These specific ISOs are designed for a wide range of professional activities, ranging from industry, transport to the clerical and professional sectors. So far, the OSI for professional drivers has been validated and extensively tested, the OSI for doctors is in the final phase of piloting, and OSI for teachers, production workers, office workers, air traffic controllers and for airline pilots are under development. OSI for Professional Drivers Our experience with OSI for professional drivers illustrates these points. As can be seen in Appendix 2, the OSI questionnaire for professional drivers is about half the duration of the general ISO, and the questions are very concrete and relevant to this occupational group. We first identified the characteristics of professional driving, which are relatively constant, such as: - the need to make and make quick, unreported, but somewhat automatic decisions (a combination of decision underload and high demand) - no possibility of ignoring incoming signals (strict temporal pressure on the entry level) - no chance of influencing the rate at which new signals are received (extrinsic temporal pressure on the input level) contribute to the high demand low control of professional drivers, but because they are relatively fixed characteristics of the profession, requests in this regard would be superfluous. In addition, professional conduct embodies vigilant activity that avoids threats, with demands for high levels of vigilance and potentially fatal consequences as a result of a momentary error or even a slight decision-making error. Again, there is no need to ask about that. We then took the remaining variable characteristics of professional driving, and sought to implement them in relation to the traffic environment: road and vehicle conditions, types of roads, passengers, accidents, as well as work schedules, the rigour of the time table, breaks, etc. These questions are presented in a neutral manner, in order to minimize reporting biases, in particular denial or repressive adaptation. A few examples are given of how this has been done with respect to the elements of the high demand for inputs by underload. The frequency of incoming signals is noted by where the pipe mainly takes place: within the city means a high frequency of incoming signals (high demand), while driving mainly on long intercity routes is noted as low incoming signal frequency (underload). Heterogeneous signals (high demand) are encountered when driving on different roads while driving on the same road day after day, relatively homogeneous signals are observed (underload). The conflict between a strict schedule and compliance with other task requirements, as described by Gardell et al. (1983) is reflected in a point of conflict in the performance of tasks. The OSI for professional drivers has now been applied to 327 people. Drivers tell us that it is easy for them to complete the questionnaire and that it only takes a few minutes for them to do so. Cronbach's alpha for the total OSI for professional drivers is 0.84 (variable characteristics only). Some results obtained using the OSI for professional drivers are presented in the following section. OSI for Physicians An OSI for physicians is in the final stages of pilot testing, and should be available on this website shortly. Since the authors of this instrument are themselves physicians (Drs. Karen Belkic and Cedo Savic), the first phase of development was based on our own experience in a variety of clinical settings. As we began testing OSI for physicians, we contextualized this title of Doctors for Physicians as part of a participatory action research approach. This point is emphasized here because of the central position of physicians with respect to the workplace and health outcomes. Namely, physicians are often called upon to make decisions about fitness to work, and can potentially have an impact on patients' working conditions by making informed recommendations. (See Belkic, Schnall and Ugljesic 2000(b), Fisher and Belkic, 2000). At the same time, physicians are increasingly faced with an attack on decision-making latitude, increased requirements, etc., particularly in the context of managed care. The underlying burden of physicians' work is heavy. The documentation and quantification of this burden is important for many reasons. As an empowerment tool for

physicians, we hope this will help improve the working conditions of our own profession. We also hope that this process can translate into a better understanding of patients' working conditions. Our colleagues' response to the pilot trials has been very positive and we are grateful for the time they have taken to provide valuable information about their professional lives and how it could be improved. There are several elements in decision-making, which are fixed characteristics of working as a physician: - need to make complex and complicated decisions (high demand for decision-making) - seriousness, potentially fatal consequences of a bad decision (avoidance of threat at the decision-making level) - receiving conflicting information (conflict/uncertainty at the level Specific aspects of the physician's work environment, which may vary to some extent and contribute to their stress load, include: 'frequency of incoming signals: related to patient load and establishment (emergency room or intensive care unit versus outpatients) - ability to defer the following decisions: related to the facility (emergency room or intensive care room versus outpatients) - the need for a quick task : : invasive procedures or emergency care - rigour in decision-making: related to the degree of control over areas such as hospitalization indications and procedures - external temporal pressure on the level of production / control over the pace of the task execution: related to the control of the number of patients, on schedules, other tasks at the general level, in addition to accidents, we have included other cognitively aversive consequences—disastrous consequences such as patient suicide or being confronted with malfeasant disputes. These are major stressful events that can occur in the doctor's career. We are also broadening the scope of conflict at the general level to include cooperation with staff, colleagues and support in the display of knowledge and career advancement. The more important issues related to the control of institutional policies, etc. can be addressed in an extension of the dimension of rigour at the general level (see perspectives). In the future, we also hope to develop an OSI for nurses and other health care workers. OSI for teachers Increasingly, adverse health effects, particularly burnout (van der Berghe, 1999) are being reported among teachers, with regard to an ever-increasing stress burden. We are in the process of developing an ISO for teachers to describe and quantify this burden and to help identify key points of intervention. A number of fixed characteristics of their work contribute to a high demand: - Attention to several sources of information simultaneously (high demand for inputs) - Essential communication at work (high demand for inputs) - The need to make complex and complicated decisions (strong central demand) Variable characteristics in the teacher's work environment that are cited as a exacerbating of stressors include: 'Rapidity of new information - relating to class sizes - Acceleration and pressure on deadlines (pressure of extrinsic time at the general level) — relating to class size and curriculum requests, as well as the need for other tasks such as administration - Conflicts and uncertainties, as well as students who avoid threats and oppose students who oppose the charge - Administrative task - a source of high demand , Extrinsic pressure and time conflict - Threat of avoidance of violence and avoidance of violence at the level of task performance - Interruptions as requiring a change of work plan and hindering the performance of tasks (conflict over central decision-making and the level of job performance) - Control of the pace of work related to the control of the classrooms, number of problem students, curriculum size and pressure to supplement OSI office workers - the human-computer interface Desktop work increasingly relies on computer technology. While it is possible to increase productivity, there are specific stressors that arise from the human-computer interaction to which office workers are exposed (Smith, 1999). We try to describe and quantify these and other stressors that are relevant to office workers in this specific OSI. Examples of these stressors include: interruptions (source of conflict), conflict, lack of control related to electronic surveillance, slowing down waiting times creating underloading, disaster potential (material or other type of damage) -- sending a wrong file, opening a virus-infected file, cluttering up - incompatible types of software — hindering task performance, etc. OSI for Air Transport Professionals: Air Traffic Controllers and Pilots These professions carry a huge responsibility, with maximum vigilance for decision makers and decision-makers. They are also characterized by alternations between underloading and extremely high demands, with requirements to generate peak attention levels at certain times. As Levi (1981) mentioned, generating these very high levels of attention creates a heavy burden on the human nervous system. Judgment requirements place a heavy burden on decision-making capacity. Variable characteristics that affect the load on air traffic controllers include: average traffic density - maximum traffic density (highest attention request) - latitude to change decision-making strategy - considered a key buffer by Biss (1971) and Sperandio (19)71), and one that is compromised by the pressure of time and other constraints Descriptions of these stressors can be found in Costa (1993) Emdad (1997) and Landsbergis (1986). Semi-structured interviews are planned with air traffic controllers who have worked in a variety of contexts. Maximum attention requests are placed on pilots during take-off and landing. Especially during long flights, there are long periods of relative underloading with the need to continually maintain high levels of alertness. Pilots are subject to extremely strict performance control and must constantly adhere to high licensing standards. Pressure to meet the timetable and, at the same time, to do their job safely is a key source of conflict. We conducted initial semi-structured interviews from which an initial version of the OSI for pilots can be developed for testing. OSI for production line workers Assembly line work can be seen as the embodiment of labour tension, as rhythmic work with low control and high demand. However, there are variations that exacerbate or improve the burden of stress. Trends in the former direction - that is, lean production - are examined in (Landsbergis, 1999). Some variable characteristics of online production work include: 'The high frequency of incoming signals - related to the of the line - Simple and homogeneous tasks - entry and output underload related to short cycle time - Tough on the level of performance of the task, as well as a degree of alertness to avoiding threats may be related to the quality control procedure - Physical exposures (noise, glare, vibration, lifting, chemicals, heat, cold) - Extrinsic time pressure on the level of performance of the task - whether working directly on the line of Assembly control An important element of the line of control on the rate of task performance relates to the question of whether the work is directly on the assembly line as opposed to the tasks that can be done from the (on a separate desk or workstation). In the latter case, the worker would usually have more time-to-moment control over performance speed. The OSI for production line workers is being developed with Drs. Paul Landsbergis and Peter Schnall and will be tested among automotive workers. Some of the salient results obtained using the Occupational Stress Index (unless otherwise indicated, two-sample t tests were used, with levels of importance to two tails cited) We will now briefly present some of our results using the OSI for occupational-to-occupation analyses and analyses within the occupation. Details of the study methodology, including the assembly of samples, are provided in the references cited. Between the Employment Analysis The total occupational burden of professional drivers compared to professional references As shown in Table 1, the groups examined of professional drivers (heterogeneous profiles) had about twice as many total OSI scores as those of a heterogeneous group of construction workers (N-227) and subway guards (N-23) (Belkic 1992(b), Belkic 1996, Emdad 1997(b).). Table 1 Average Total OSI Scores for Professional Drivers Compared to Reference Groups Professional Drivers (Average)Sd) Level of Importance Referents (average -/sd) 67.2 -/- 4.3 (N-258) p-lt; 0.001 33.0 -/- 7.9 (N -227) 63.6 -/- 4.0 (N-69) p-lt; 0.001 34.8 -/- 6.1 (N-23) References: Belkic et al. (1992b) and 1996), Emdad et al. 1997 b) High demand, low employment control and employment tension among professional drivers compared to work references Here is an example (Table 2) of how a more detailed and operational approach to demand and control dimensions identifies professional drivers as a high-voltage occupational group. We found a significant and positive correlation between the demand/control ratio assessed using the Swedish Psychosocial Tension Questionnaire (Theorell, 1988) and the total OSI score. (Belkic, 1996, Emdad, 1997 b)). However, using the five standard application size questions from the above questionnaire (Theorell, 1988), professional drivers achieved results not significantly below the metro attendant referrals. In terms of decision-making latitude, jurisdictional discretion, and the demand-to-control ratio as a quotient term, there were also no significant differences. On the other hand, the total scores for the high demand, rigour and extrinsic time pressure dimensions of the OSI were all significantly higher among the In addition, a breakdown of the demand dimension using the OSI reveals that the heaviest demand is at the entry level, whereby drivers must track several information mainly from visual sources simultaneously, but using the three sensory modalities (fixed characteristics). In addition, urban transit operators have a high frequency of incoming signals and must communicate with the public. Table 2 Dimensions of Demand and Control using the Swedish Questionnaire on Psychosocial Tension and the Occupational Stress Index: Comparisons Between Drivers and Subway Guard Attendants Professional Drivers (mean +/- sd) Level of Significance Subway Attendants (mean +/- sd) Job Strain (N=34) (N=23) Skill Discretion 10.0 +/- 1.9 non-significant 8.7 +/-3.3 Decision Latitude 3.7 +/- 1.5 non-significant 4.4 +/- 2.2 Demand 11.9 +/- 3.8 non-significant 12.3 +/- 3.4 Demand/control 0.97 +/- 0.3 non-significant 1.0 +/- 0.4 OSI High Demand 16.1 +/- 2.1 p < 0.001 6.4 +/- 3.8 Strictness 9.0 +/- 0.0 p < 0.001 6.8 +/- 1.8 Extrinsic Time Pressure 6.6 +/-1.7 p < 0.001 4.8 +/- 1.1 Input High Demand 9.1 +/- 1.2 p < 0.001 3.4 +/- 1.2 Central High Demand 2.0 +/- 0.2 p < 0.01 1.3 +/- 1.4 Output High Demand 3.9 +/- 0.5 p < 0.001 1.0 +/- 1.1 References: Belkic et al. (1996), Emdad et al.(1997(b) Within-Occupation Analyses The Occupational Stress Index has also shown validity in within-occupation analyses. Total OSI as a predictor of smoking intensity The overall burden of exacerbated (i.e. non-fixed) stressors in the work environment of professional drivers, as assessed by the total OSI independently predicts cardio-harmful behaviours such as smoking intensity within this group (Belkic, 1996, Emdad, 1998). The multiple linear regression analysis is shown in Table 3. Table 3 Significant Independent Indicators of Smoking Intensity among Professional Drivers Who Are Current Smokers (N-32) Multiple Linear Regression Independent Variables Standardized Regression Coefficient SE P Adjusted R (squared) - 0.37 Number of years of smoking 0.52 0.18 0.005 Total OSI 0.42 0.36 0.02 References: Belkic et al. (1996), Emdad et al. (1998) Comparisons between truckers and urban bus drivers As we have said, professional drivers as a group are exposed to very high levels of occupational stressors and all have a lot in common. However, each driver profile also faces a specific set of stressors. As Shown in Table 4, we used the OSI to compare 130 city bus drivers and 69 truckers. The average total scores of the OSI were very high for both groups (65.2-3.6 and 68.7/3.8, respectively) (Belkic 1995). However, while these two groups share many characteristics of their work environment, using OSI, we were able to identify a number of important differences. A major difference is that bus drivers in the city are primarily faced with overload, while truckers are exposed to a mixture of underloading and overload. Bus drivers in the city had a higher demand score due to receiving a quick flow of new information and having to communicate with the public, as well as performing more tasks simultaneously and often missing rest breaks and At night. On the other hand, when driving on long roads, truckers have a relatively small flow of new information (monotony) and often drive alone, which is another source of underloading, as well as social isolation. At the same time, they must always keep their sensory systems (especially visuals) on full alert at all times ready to make quick decisions and actions. This need for sustained vigilant surveillance combined with road conditions are recognized as a very important factor in fatigue while driving long-distance trucks (Williamson, 1996). Another source of underloading, which contributes to fatigue, is delays and long wait times. We found that these are common occurrences among truckers. Another important difference is that truckers worked much longer and were paid for by the number of roads travelled (two major sources of overload). Truckers carried out heavy lifting work much more often and drove in more dangerous conditions (including transporting explosive goods and driving on narrow, winding roads). However, they reported fewer accidents. The pressure of extrinsic weather was greater for the city's bus drivers because they had to follow a rigid schedule. They were exposed to more glare due to driving at night, and had more exposure to vibrations due to poorer shock absorbers, as well as poorer heating, cooling and isolation systems in their vehicles. The city's bus drivers had more conflict or uncertainty at various levels. Conflicts at the entry level were related to more difficult signal detection due to decreased visibility. They also had more vehicle breakdowns, other obstacles to job performance, a poorer interpersonal work atmosphere, and more conflicts between the need to arrive on time and the traffic congestion that prevented them from doing so. These latest results coincide with reports by Gardell (1983), Syme (1991) and Evans (1994) that the working environment of urban bus drivers often implies the need for rigid adherence to the schedule, which is hampered by traffic congestion. This leads to conflicts and even punitive consequences, as well as the loss of much-needed rest breaks. The threat of violence is another stressor that increases the cognitive aversivity of the city's transit drivers' work environment. The reader is referred to Section 1 and Section 2 for further discussion of truck drivers and urban transit operators, respectively, on this website. Table 4 Comparison of average total OSI scores, underload and strong demand among city bus drivers and truck drivers Urban Bus Drivers (average) Level of Importance Truck Drivers (average) (N-130) (N-69) Total OSI 68.7/3.8 0.001 65.2 -/- 3.6 Total Underload Score 5.0 -/- 1.3 P -lt; 0.001 8.1 -/- 1.9 Total Score of Strong Demand 21.0 -/- 2.0 P'lt; 0.001 17.2 - 2.1 Belkic et al. (1995(a)) Work factors that independently identify occupational drivers with hypertension and ischemic heart disease We have also developed several logistic regression models to find the set of independent factors that best identify occupational drivers with hypertension and those who have suffered from ischemic heart disease events, (Belkic, 1996, Emdad, 1997 b)). Extrinsic time pressure at the general level was an independent predictor of hypertensive status among conductors (beta coefficient - 2.24, p-0.04). Long hours of work - an element of demand at the general level, was one of two significant factors that identified drivers who had experienced cardiac events (beta coefficient-2.91, p-0.03). For example, two stressors in the driver's work environment, as assessed using OSI, could be related to hypertension and IHD in these occupational driver groups. Limitations in current OSI applications and Outlook for the Future A major limitation on the current application of the occupational stress index was the linear nature of the analyses that were carried out. It is necessary to explore the possibilities of multiplier interactions and higher-level terms, especially compared to existing models such as Job Strain. In the long run, weighting factors could be developed to reflect the relative contribution of the various factors to the total burden. Extrinsic time pressure and rigor dimensions have a low Cronbach alpha for general OSI. This needs to be retested with occupation-specific ISOs. It may be useful to do the factor analysis. For example, there may be one control factor on task performance, pressure and acceleration of delays, and another related to entry and centre levels. As things stand, many key macro-level stressors are not included in the OSI. These include job security, adequacy of pay, lack of control over work schedules, as well as more important issues such as institutional policy, buffers such as unionization/collective control (Johnson, 1995), promotions (Siegrist, 1996). Many of them are important in terms of cardiovascular outcomes. It is also necessary to reflect the emotional rewards inherent in work (as opposed to social support). We are now looking at the possibility of broadening the rigour and dimensions of conflict at the general level to incorporate some of these factors. In the current versions of the OSI, we asked about rest breaks and long working hours as general factors affecting high demand. We can include the number of vacation days in the following versions. Interpersonal relationships at work have so far been evaluated in the OSI with only one point as an overall assessment. This could be broken down to refer to supervisors, co-workers and other staff. Integration could be done with objective measurements (part of the triangulation). For example, for city bus drivers, there may be finer gradations to the high frequency rating of incoming signals based on traffic density measurements. Using logic the average number of passengers could improve the amount of the burden of communicating with the public. Information obtained from the assessment of employment characteristics by observer experts, as Greiner and Krause (2000) pointed out, could be very well integrated into the OSI. On the other hand, the OSI could detect areas for which in-depth observational analysis is needed, particularly in order to concretely improve the working environment. Permission to use any of the OSI instruments must be by Dr. Karen Belkic: Center for Social Epidemiology, Room 202, 1528 6th Street, Santa Monica, California email: kbelkic@hsc.usc.edu. Our policy is to grant free permission to all research efforts aimed at improving employment conditions and the health of workers. We look forward to answering questions about its application, and discussing how best to implement the ISO in a given context. All emerging publications using the OSI should recognize the author's permission and cite appropriate references. References Belkic, K; Savic, C; Djordjevic, M; Ugljesic, M; Mickovic, Lj. Event-related potential among professional drivers in the city: increased sensitivity to cognitively relevant visual cues. Physiol Behav. 1992 (a); 52: 423-427. Belkic K, Savic C, Theorell T, Cizinsky S. Work Stressors and Cardiovascular Risk: Assessment for Clinical Practice. Part I. Stockholm (Sweden): Stress Research Reports. National Institute of Psychosocial Factors and Health. Stress Research Section, Karolinska Institute, WHO Psychosocial Centre; 1995(Report number: 256. Belkic, K; Pavlovic, S; Djordjevic, M; Ugljesic, M; Mickovic, Lj. Determinants of cardiac risk in professional drivers. Kardiologija 1992 (b); 13: 145-149. Belkic, K; Savic, C; Theorrell, T; Rakic, Lj; Ercegovac, D; Djordjevic, M. Heart Risk Mechanisms in Professional Drivers. Scand J Work About Health 20:73-86; 1994. Belkic K. Psychosocial triggers of myocardial ischemia in women. Research report to the Swedish Medical Research Council. 1995 (b). Belkic K, Emdad R, Theorell T, Cizinsky S, Wennberg A, Hagman M, Johansson L, Savic C, Olsson K. Neurocardiac mechanisms of heart disease risk among professional drivers. Stockholm: Swedish Working Life Fund, 1996. Belkic K, Emdad R, Theorell T. Professional Profile and Heart Risk: Possible mechanisms and implications for professional drivers. International Journal of Occupational Medicine and Environmental Health. 1998; 11: 37-57. Belkic K, Savic C. Dehumanization versus humanization of work: Insights into cognitive ergonomics and brain research. . In: Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Occupational Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000 a); 15: 87-94. Belkic K, Schnall P, Ugljesic M.Cardiovascular evaluation of the work and workplace: A practical guide for clinicians. In: Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Occupational Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000, point b); 15 (1): 213-222. Bisseret A. Analysis of air traffic control processes. Ergonomics. 1971; 14: 565-570. Cobb S, Rose RM. Hypertension, disease diabetes in air traffic controllers. JAMA 1973; 224: 489-492. Corley KC , O'Shiel F, Mauck HP. Myocardial degeneration and cardiac arrest in squirrel monkeys. Physiological and psychological correlates. Psychophysiology 1977; 14: 322-328. Costa G G air traffic controllers' workload. Ergonomics. 1993; 36: 1111-1120. Emdad R, Belkic K, Theorell T. Cardiovascular dysfunction related to threat, avoidance and vigilant work: Application of event-related potentials and criticism. Integ Physiol Behav 1997 32: 202-219. Emdad R, Belkic K, Theorell T, Cizinsky S, Savic C, Olsson K. Work environment, neurophysiological and psychophysiological models in professional drivers with and without cardiovascular disease: Research of an integrative neurocardiological approach. Stress Med 1997 (b); 13: 7-21. Emdad R, Belkic K, Theorell T, Cizinsky S. What prevents professional drivers from following the cardiological advice of physicians? Psychoth Psychosom 1998; 67: 226-240. Erikssen J, Johansen AH, Rodahl K. Coronaire heart disease in Norwegian sea-pilots: part of the occupational hazard? Acta Med Scand Suppl. 645: 79-83 Evans GW. Working on the hot seat: urban bus operators. Accid Anal Prev 1994; 22: 181-193. Fisher J, Belkic K. A public health approach in clinical practice. In: Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Occupational Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000; 15: 245-253. Gardell B, Aronsson G, Barklof K. The working environment of local public transport staff. Stockholm: The Swedish Working Environment Fund, 1983. Greiner BA, Krause N. Expert-observer assessment of job characteristics. In: Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Occupational Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000; 15: 175-183. Ivanitsky AM. Evoked potentials and mental processes. In Lechner H, Aranibar A. Electroencephaologr Clin Neurophysiol Amsterdam: Excerita Medica, 1980, pp. 727-732. Johnson JV, Hall EM. Class, work and health. In: Amick B, Levine S, Tarlov AR, Walsh Dc (eds): Society and Health. New York, Oxford University Press, 1995, 247-271. JWH Kalsbeek. Prevention of excessive mental load, and how the industrial engineer and the ergonomen can cooperate. Laboratorium voor ergonomische psychology van de gezondheidarganisatie, TNP. European Federation of Productivity Services Conference, Berlin, 1974. Karasek RA. Job applications, employment decision latitude and mental tension: Implications for job overhaul. Adm Sci Q 1979; 24: 285-307. Landesbergis PA. Is air traffic control a stressful job? Work study journal. 1986;***: 117-134. Landsbergis PA, Cahill J, Schnall PL. The impact of lean production and new related work organization systems on workers' health. J Occupy Health Psychol 1999; 4: 1-23. Landsbergis PA, Theorell T. Measurement of psychosocial workplace exposure variables: Self-report questionnaires. Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Occupational Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000; 15: 163-171. Lazarus, R.S. (1967). Stress theory and psychophysiological research. In L. Levi (Ed.), Physiological emotional stress and Reactions Medical, industrial and military implications. Mr. Foersvarsmedicin. 3: 152-177. Levi L. Preventing stress at work. Reading: Addison-Wesley Publishing Co., 1981. Lown B. Role of higher nerve activity in sudden cardiac death. Jpn Circ J. 1990; 54: 581-602. Luczak H. The use of simulators to test individual mental work ability. Ergonomics 1971; 14: 651-660. Martin, F., Siddle, D.A.T., Gourley, M., Taylor, J., Dick, R. (1992). P300 and traffic scenes: The effect of temazepam. Biological Psychology, 33: 225-240. Menotti A, Seccareccia F. Physical activity at work and professional responsibility as risk factors for fatal coronary heart disease and other causes of death. J Epidemiol Commun Health 1985; 39: 325-329. Murphy LR: Employment dimensions associated with severe disability due to cardiovascular disease. J Clin Epidemiol 1991; 44: 155-166. Parasuraman, R. (1984). Sustained attention in detection and discrimination. In R. Parasuraman and D.R. Davies (Ed.), Varieties of Attention. Orlando: Academic Press, Inc., 243-271. Ragland DR, Greiner BA, Holman BL, Fisher JM. Hypertension and years of driving among transit drivers. Scand J Soc Med 1997; 25: 271-279. Siegrist J. Adverse health effects of high-stress/low-yield conditions. J Occupy Health Psychol. 1996; 1: 27-41. Siegrist J, Peter R, Georg W, Cremer P, Seidel D. Psychosocial and biobehavioural characteristics of hypertensive men with high atherogenic lipids. Atherosclerosis 1991; 86: 211-218. Smith MJ, Conway FT, Karsh B-T. Occupational stress in human computing interaction. Indust Health 1999; 37: 157-173. Sperandio JC. Change in operator strategies and control of workload effects. Ergonomics 1971; 14: 571-577 Stroh, C.M. (1971). Vigilance: The problem of sustained attention. Oxford: Pergamon Press. Suurnakki T, Ilmarinen J, Wagar G, Jarvinen E, Landau K. Cardiovascular diseases and occupational stressors of municipal employees in Finland. Int Arch Occupy About Health 1987; 59: 107-114. Syme L. Social epidemiology and work environment. In Johnson J, Johansson G. The psychosocial work environment. Amityville, New York: Baywood, 1991, 21-32. Theorell T. Medical and physiological aspects of occupational interventions. In: Cooper CL, Robertson IT (eds.). International Review of Industrial and Organization Psychology.1993, Vol 8, New York, John Wiley, 1993, 173-192. Theorell T, Perski A, 'kerstedt T' , Sigala F, Ahlberg-Hulten G, Svensson J, et al. Changes in employment tension in relation to changes in physiological states A longitudinal study. Scand J Work About Health 1988; 14: 189-196. Tuchsen F. Professions at high risk for cardiovascular disease. In: Schnall PL, Belkic K, Landsbergis PA, Baker D (ed.) Medicine: State of the Art Review. The workplace and cardiovascular disease. 2000; 15: 57-60. van der Berghe R, Huberman AM (dds.). Understand and prevent teacher burnout. A book source of research and practice in the internatonale. Cambridge University Press, Cambridge, Cambridge, Welford AT. The measurement of sensory-motor performance: Survey and re-evaluation of the twelve years of progress. Ergonomics 1960; 3: 189-230. Williamson AM, Feyer A-M, Friswell R. The impact of work practices on fatigue among long-distance truck drivers. Accid Anal Prev 1996; 28: 709-719. Winkleby, MA; Ragland, DR; Fisher, JM; Sl Syme. Excessive risk of illness and illness among bus drivers: A Review and Synthesis of Epidemiological Studies Int J Epidemiol 1988; 17: 255-262. 255-262.