

**Ergonomics Workplace Analysis**  
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**Lecture - 11**  
**Psychological Aspect of Workplace Analysis**

Good morning all. So, let us start a new topic for today's class is Psychosocial Aspects of Workplace Analysis, again we discussed physical ergonomics, we discussed cognitive ergonomics. Now when we are talking about psychosocial aspects it is very important because when we are at workplace we are not individual right. So, we are working in a place where there are different people, different person and we are interacting with them, we are interacting within us right and then we are actually performing.

So, understanding this psychology of that particular work within in association of the social context, when we are talking about ergonomics principle and the behavior of those workers then it becomes a broader field where people can understand more about the performance of that particular operator, working capacity or capability and the kind of productivity we are talking about. So, psychosocial aspect is very important component when we talk about ergonomics. So, let us understand, what are the psychosocial risk factors are.

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The **psychosocial** factors arise from poor **work design**, **organization** and **management** as well as poor **social context** of work.

These may lead to **negative** psychological, physical and social outcomes such as work related stress, depression, reduced motivation and output.

**Psychosocial Risk Factors** These can be of two types: personal and organizational.

**Personal factors** include anxiety, depression etc.

**Organizational factors** include excessive workload, conflicting demand and lack of role clarity, lack of control over the job, poorly managed organizational change, job insecurity, lack of supportive environment, lack of reward, harassment etc.

So, psychosocial factors arise from poor work design, organization and management. So, if these things are there then definitely you will get a risk also poor social context. So, work design, organization and management and social context. If these things are poor then you may have a psychosocial risk which has a big negative impact on your physical capacity as well as mental health k. So, we are going to discuss about these few things today. So, these negative psychological, physical and social outcome has effect on the work related stress. Specially it creates depression, reduced motivation and finally, it affect the output.

So, these things can be two type, one is personal and another is organizational. If we are talking about personal factors may be anxiety, depression are the results. Whereas we are talking about organizational factor causes may be excessive work load, conflicting work demand, lack of role clarity, lack of control over the job, poorly managed organizational change, job insecurity, many other thing low salary and all those things.

So, these are some organizational factor which really can affect your performance. So, how these personal and organizational factors actually is associated with the productivity and performance of that particular worker or operator. And their own personal health especially musculoskeletal system, sometimes digestive system, sometimes the neural system so, we are going to discuss that today.

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#### **Psychosocial Factors and Physical Risk**

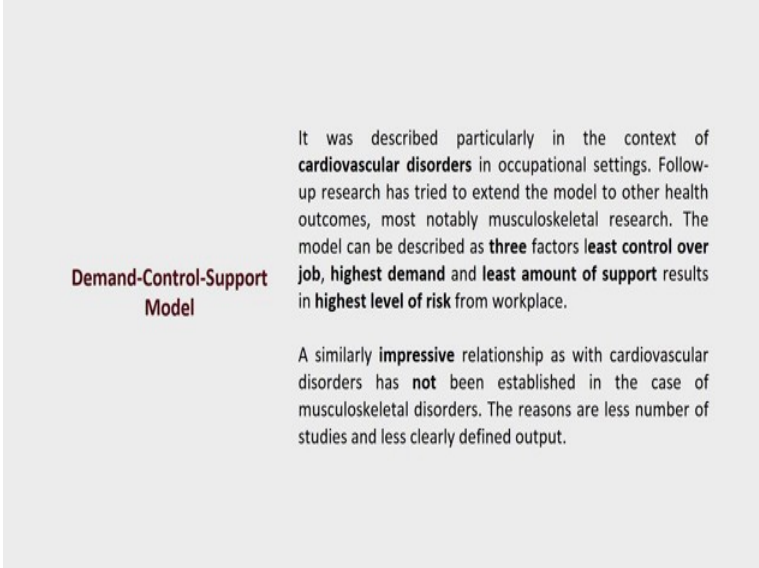
It is an established fact that **psychosocial** factors play a role in development of **work related musculoskeletal disorders**. Detailed relationship with both personal and workplace factors have been established. The effects of psychosocial factors have been observed mostly in the case of **neck, shoulder** and **low back** pain. **Strongest** association has been found with **neck** pain. There are very few studies exploring the contribution of psychosocial factors on UEMSDs.

Different models have been described for **causal pathways** of effect of **psychosocial factors**.

So, it is an established fact like already there are varieties of studies available which say that psychosocial factors plays an important role in the development of work related MSD. So, the detailed relationship has been established for both personal and work place factor. And the effects of the psychosocial factors have been observed mostly in the case of neck, shoulder and low back mainly, but if we talk about the psychosocial stress or psychosocial risk factors it has more strongest relation with neck pain.

Now, if you are currently working and really the kind of a workspace or workplace you have at your organization or you have seen people where the workplace factor has an impact try to correlate or try to visualize those symptoms or features with this particular concept. So, if we are talking about high amount of psychosocial risk you will get lot of neck related issue. So, that is already an established fact nothing to establish over here. So, there are different causal pathway models have been developed and they have established it how those you know impacts are there on the development of the different effects like neck pain, back pain or shoulder pain, mainly neck pain ok.

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**Demand-Control-Support Model**

It was described particularly in the context of **cardiovascular disorders** in occupational settings. Follow-up research has tried to extend the model to other health outcomes, most notably musculoskeletal research. The model can be described as **three factors least control over job, highest demand and least amount of support** results in **highest level of risk** from workplace.

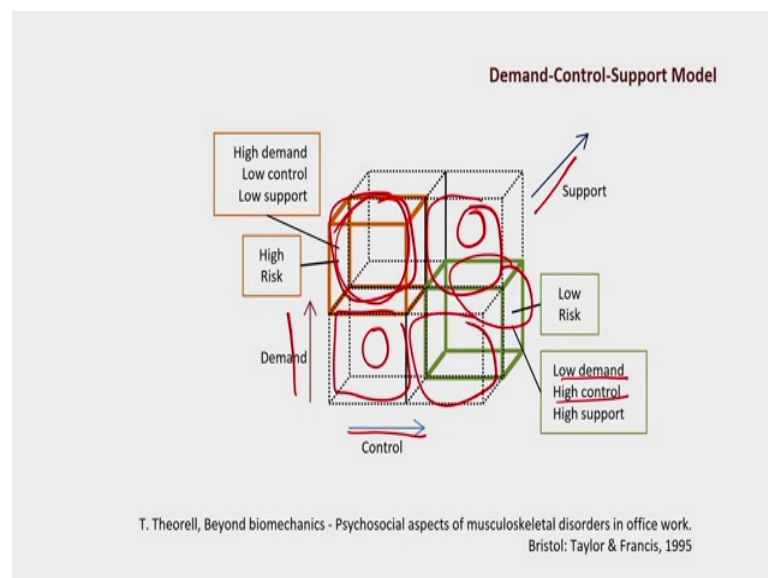
A similarly **impressive** relationship as with cardiovascular disorders has **not** been established in the case of musculoskeletal disorders. The reasons are less number of studies and less clearly defined output.

So, I will just explain 1 or 2 models. So, it was described particularly in the context of cardiovascular disorder in occupational setting. So, it is a demand control support model ok. So, by terminology itself you do understand you have demand, you have control, you have support and how these 3 factors is associated or related in a particular context and how those has an impact on the development of the cardiovascular disorders.

So, these 3 factors least control over has actually least control over the job, highest demand and least amount of support if these type of situation arise it results in highest level of risk from the workplace. So, a similarly impressive relationship can be established with cardiovascular disorder, but it has not been established the way it has been established for the other factors.

So, the results are less number of studies available so, you have a scope to do different studies over there may be in Indian context may be or occupational specific occupation may be all occupation or all kind of work space and not reacting the same way or same intensity how the others are. So, let us understand this particular demand control support model.

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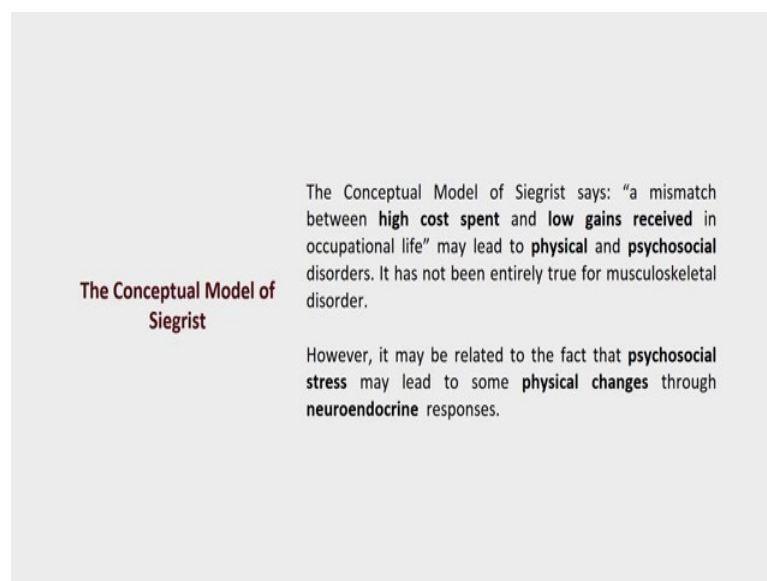
So, if we are talking about 3 dimension. So, one is control, another is y axis demand and z axis is the support. Then if you are in this particular segment you have low risk. So, low demand, high control, demand is less, control is very high you have support as well so, you have low risk.

Just on the opposite side where demand is very high. So, your boss is say yes you have to do this you have to do that all these demands are there, but over that you do not have much control, you do not have much support on that particular job then you are at very high risk. But these 2 component where all are in moderate condition may be are like control is less, demand is also less. So, you do not have much problem right.

Here you have high control, high support, high demand. So, there also you can manage the work. So, risky zone is very much this one. So, when you talk about understanding your works working set up or variable available within that you need to understand where you are look at it. So, are you in this particular portion or here or here or here.

So, if you understand that then based on that situation you need to develop the intervention like maybe it is a product, maybe it is a system, maybe it is just the information processing like how the information is passing from one to another, how it is, how the position of the layout of that particular location, how if you can do those changes probably there will be changes within that particular model. So, this is a very important model we normally use in the field of psychophysiology. Of course, this is a published paper you can read this particular paper and then get more information.

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So, another model is conceptual model. So, this particular conceptual model it says that a mismatch between the high cost spent and low gains received in occupational life. Very easy to understand when you are spending so much in terms of energy, in terms of your effort, in terms of your expect, in terms of your may be the money, whatever. So, if you are spending lot of thing, but you are gaining back very less then if there is a mismatch then of course, there will be a stress or there will be a problem in the occupational life which can lead to physical and psychosocial disorders ok.

So; however, it may be related to the fact that the psychosocial stress may lead to physical changes through neuroendocrine responses. Of course, it is very very important when you have some kind of physical changes and I know you have a lot of mental stress or lot of other issues, then your whole endocrine system like your enzyme your other secretion of your body hormonal secretion of your body will change.

So, which in turn will affect your physical health so, that is very much irrelevant and of course, you can see these phenomena in your real life. But you must have not quantified it or you must have not analyzed it in terms of intervention or you must have not realized that how to control those you know causal factors. So, if you can do that root cause analysis of course, you can develop an intervention program which will be very successful. So, understanding these pathways are very very important. So, of course, there is an effect of biological stress on the musculoskeletal system.

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**Biological Effect of Stress on Musculoskeletal System**

In this model **biological effect of stress on musculoskeletal system** has been described. This model explains the **psychological stress** and **musculoskeletal system's feedback relationship**. According to this, **psychosocial factors** (example, job control) influence **biomechanical loads** through **enhancement** or **reduction of tolerance**. In turn, biomechanical factors affects psychosocial load through hormones such as cortisol or muscle tension.

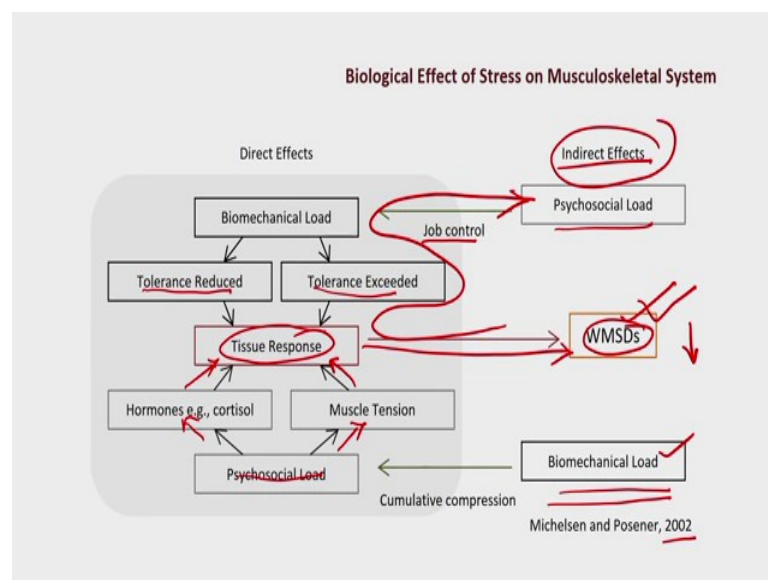
This feedback system **cumulatively** changes the tissue response to a particular job.

So, this is one more model that says the effect of biological effects of the stress on the musculoskeletal system. What it says? It says that psychological stress and musculoskeletal system feedback relationship. So, if you have psychological same way like the first slide when I was trying to explain it is an established fact. If you have lot of mental stress or psychological stress you can see lot of lot of neck trouble, lot of shoulder trouble, lot of back trouble right. So, it is again as a musculoskeletal disorder.

So, according to this, particular model that psychosocial factors may be job control, job clarity or whatever so, influences the biomechanical loads through enhancement or reduction of tolerance. So, when the tolerance level changes the affect will be there on your musculoskeletal system.

So, in this in turn actually affect the biomechanical factors of that particular person and of course, there are changes in the cortisol level or muscle tension and you may be the effect may be the development of musculoskeletal disorder. So, this feedback system has lot of impact and of course, you can do very small changes in the whole workplace situation and you can improve the musculoskeletal health. So, this is very important.

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So, this is the kind of diagrammatic representation of this particular model again this is you can read this whole paper from this particular journal. I have given the references later. So, you have biomechanical load which can impact your tolerance level, if it is increased or exceeds, if it is decreased or exceeds ultimately it will impact your tissue responses. Now here you have psychosocial load which has impact on hormones and muscle tension, which again in turn has affect on the tissue responses.

So, when you have all this finally, it is going to affect on the work related MSD. Now if you know all this thing let us understand how it is happening. It is happening from indirect effect that is the psychosocial load may be job control job, demand or many



other factors or from the biomechanical load like you know awkward posture, very high lifting or many other things.

So, indirect and some biomechanical aspects will be there then finally, impact will be here as the work related musculoskeletal disorder. So, maybe when we start evaluating the that particular workplace we may see the response here work related musculoskeletal disorder. So, may be at a particular workplace 10 persons are there 10 operators are there and you have seen 7 out of 10 are saying I have neck pain I have back pain or something like that.

Now you may say this is purely a physical responses, but really not it is our physical responses, but what the cause is. So, if you go back and check that this particular route like here going back to here, then you will come to know, if we can control the job, if we can control the demand of the job or if you can give better support to do the job maybe here there will be a reduction in the musculoskeletal disorder, same way over here for the biomechanical load ok. So, understanding that is very very important and it is very critical it is not that easy to find out that particular path when you are actually doing field study or field observation. So, it is very important.

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**Organizational Factors and Motivation**

Organizational factors influence the motivation of employees. Mental state can work with the aggravation of physical ailments or it can more directly affect through psychological process. The **negative psychosocial state** of a organization can **directly** affect the **motivation** of a worker. For example, lack of reward/payment/respect in a workplace is definitely de-motivating enough for an employee to give their best for a job. On the other side a good support system and control over job may be the exact reason to perform a job with their best.

Thus working through motivation psychosocial environment influences output rate and quality, rate of error and accidents and thus exerts effect on physical health also.

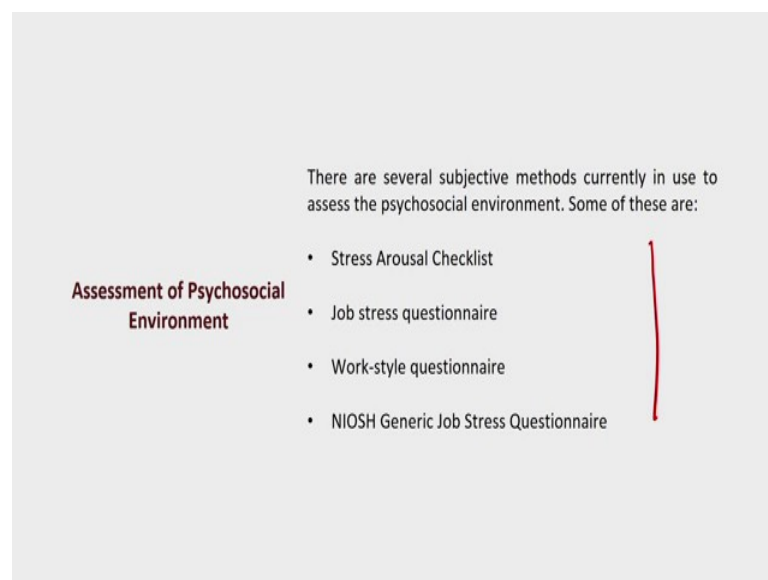
Now, there is one more important factor that is the organizational factors and motivation. So, organizational factors influence the motivation of any particular employee. So, mental state can work with aggravation of physical ailments or it can move directly



affect through psychological process. So, if there is negative psychosocial state of particular organization then it can directly affect the motivation of the worker.

So, whenever you found any responses regarding negative impact on motivation you should go back and look how it is happening. Is it related to any kind of organizational factors or not. So, that way you can do lot of intervention in terms of reward, payment, respect many other factors mainly these things are being studied in the field of in various sociological papers as well. But of course, when we are talking about productivity and how these factors are related we are talking about and intervention we are talking about ergonomics.

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Now, when we understand all these thing, let us understand how you are going to evaluate it, because the course objective is evaluation or analyzing the ergonomic workplace so, in the workplace how we are going to evaluate it.

So, there are varieties of process. I will be discussing few of them. let us understand how we can assess the psychosocial environment. So, we have stress arousal checklist, we have job stress questionnaire, we have work style questionnaire, we have NIOSH generic job stress questionnaire. These 4 are mainly used but these are not only 4. Apart from that we have many others. So, based on your own context you can use either any one of them or whatever available relevant to your contexts or you can develop something very new for your requirement and then you can validate it.

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| <b>Stress Arousal Checklist</b> | <p>This is a mood adjective checklist developed by Mackay, Cox, Burrows and Lazzerini (1978).</p> <p>SACL contains 45 adjectives that are to be rated on a 4 point scale referring to definitely feel to feel slightly.</p> <p>It is developed from <u>Thayer's Activation-Deactivation checklist</u>.</p> |
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So, let us understand what this particular stress arousal checklist says, it has total 45 adjective. Being developed in 1978 it is a very old set of checklist. So, it asks to give the rating all these 4 adjectives into 4 points scale. Finally it developed from the this activation - deactivation checklist. So, this is the source from their they have developed this particular checklist. You can use this for your context or if it matches to your context.

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| <b>Job Stress Questionnaire</b> | <p>This was developed by Caplan et al. (1975) for researching on the person-environment fit model.</p> <p>The JSQ is a 13 item questionnaire designed to reflect a 4 dimensional P-E fit model of job stress.</p> <p>Each of the dimensions reflects an aspect of the job environment which might be stress producing while interacting with a person.</p> <p>The 4 dimensions are: <u>workload</u>, <u>role conflict</u>, <u>role ambiguity</u> and <u>utilization of skills</u>.</p> <p>These are all very common sources of stress; however, these don't include every possible sources of stress.</p> |
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Another is job stress questionnaire. Caplan developed it in 1975, quite old. It has 13 items. It is basically a kind of questionnaire and 4 dimensional P-E fit model is available in this particular job stress questionnaire. So, these 4 dimensions are one is work load, second is role conflict, role ambiguity and utilization of your skill.

Now, if you see these terminologies I am not going to detailing of these particular questionnaires. So, if you have this questionnaire you can collect it and you can use and try to understand these variables. So, if you talk about work load, now if the kind of work load is there if it quite high of course. It has a negative impact on your productivity or on your physical health. If you have roll conflict, you are not in a position to understand that what you should do, what you should not do, what other should do and what other should not do. If this types of conflicts are there then of course there will be an impact on your productivity, same as utilization of skill and you know role ambiguity.

So, if you are a very highly skilled person and the job says no you need not to use that much skill may be then you will get demotivated right. So, those aspects are very important. So, how to place employee and how to judge that which work is reasonable for whom and how these setup need to be, how the job rotation is important for a particular setup. So, these things are very important when we talk about this aspects like using job stress questionnaire so, that is a one of the important rule.

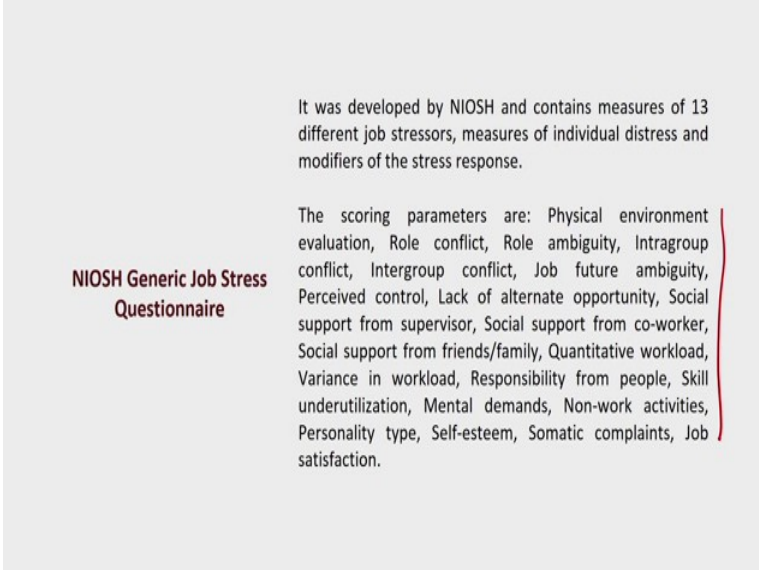
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**Job Stress Questionnaire**

- The workload items measure the quantitative aspect work overload resulting from time pressure.
- Role conflict is defined as having logically incompatible demands made by two or more persons whose job are functionally interdependent.
- Role ambiguity was considered as a state in which the person has inadequate information to perform their role.
- Utilization of skills consider a stress factor related to under utilization of previously acquired skills while performing the current job.

Also job stress questionnaire says that this particular work load item, there are varieties of items. So, it talks about finally how that person is getting motivation, how this person that particular operator is activated or utilizing their his or her full capacity to develop that no to work in that particular location or particular position of their work. So, that we gets these 4 says that different utilization of those concepts.

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**NIOSH Generic Job Stress Questionnaire**

It was developed by NIOSH and contains measures of 13 different job stressors, measures of individual distress and modifiers of the stress response.

The scoring parameters are: Physical environment evaluation, Role conflict, Role ambiguity, Intragroup conflict, Intergroup conflict, Job future ambiguity, Perceived control, Lack of alternate opportunity, Social support from supervisor, Social support from co-worker, Social support from friends/family, Quantitative workload, Variance in workload, Responsibility from people, Skill underutilization, Mental demands, Non-work activities, Personality type, Self-esteem, Somatic complaints, Job satisfaction.

Now, same as for the NIOSH generic job stress questionnaire as NIOSH is body which actually contributing a lot from the beginning or starting of this particular subject ergonomics right. So, they also have developed one particular questionnaire.

So, here in this particular questionnaire the scoring parameters that we will be seen here also 13 job stresses are going to measure. So, these are listed over here so, physical environment evaluation, role conflict, role ambiguity all these things. So, name wise, nomenclature wise is very similar, but it has different-different components and based on the questionnaire responses we club them and try to understand these variables. So, these 13 factors actually we use it for the as variables when we are talking about the measurement and analyzing these particular data.

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For a better organizational culture modification points are numerous and varied in purpose. To optimize the psychosocial risk factors some modification points are given below:

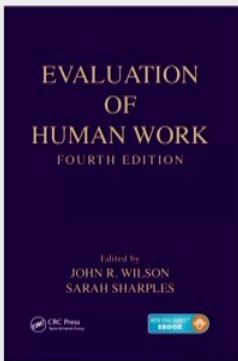
**Intervention Possibilities**

- Proper task design
- Control of job
- Support system
- Payment/Reward
- Utilization of the workers skill
- Physical design of workplace that influences the interaction of workers such as architecture, colour etc.

So, we developed it, we characterized it, we collected the data, now let us understand how we are going to utilize it, how the interventions are possible. Maybe we can do a task design, we can do a job control, we can support the system, we can work on payment or reward and may be workers skills. So, lot of thing is possible when we are talking about the psychosocial intervention.

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Few books to refer



The image shows the front cover of a book titled 'EVALUATION OF HUMAN WORK' in gold capital letters. Below the title, it says 'FOURTH EDITION' in smaller gold capital letters. Further down, it states 'Edited by JOHN R. WILSON and SARAH SHARPLES' in white capital letters. At the bottom left is the CRC Press logo, and at the bottom right is a small blue and yellow logo. The background of the cover is dark blue.

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So, we came to the end of this particular class, again this is the book what I referred to develop this whole presentation and I followed basically. So, you can refer this book as

well as the other very specific group book which talks about psycho social stress or psychosocial risk factors for ergonomics. So, what will be the task for today is now you know you try to understand these questionnaires and use at least one of them to gather few data from either from your organization if you are working.

If you are a student purely academic student then try to go get value or data from any kind of organization which is feasible to you and try to analyze it. And, after analyzing try to understand what kind of intervention is possible or what kind of intervention can improve the whole situation. So, that you way you can practice it and then you can implement it ok. So, further again the same thing that if you have query, please come back and let us know.

Thank you.