Week 1
Module 1: Stress: Its nature and physiology (3 lectures)

Lecture 1: *Overview of the course; Nature of stress 1*

What is psychology?

Psychology is the science/scientific study of behavior and mental processes.

A scientific study/science uses scientific methods. The scientific method has characteristics such as systematic observation/empiricism, objectivity, and replicability/verifiability.

Behaviors are actions that can be observed and measured.

Mental processes includes diverse activities of the mind such as perception, thinking, memory, imagination etc.

Overview of the course

This course will systematically address the issues related to the psychology of stress, health, and well-being.

In the initial level, this course will discuss the concepts of stress, health, and coping processes. Specifically, following questions will be addressed-

What is the mechanisms by which our mind creates stress?

Is there a connection between our mind and body? Can stressful experiences cause physical diseases such as heart diseases? Can stress influence our immune system?

Are there any positive dimensions of stress?

What are healthy and unhealthy coping strategies for stress management? Are there any evidence based coping strategies that can be used by us?

In the next level, this course will then discuss what lies beyond stress and coping paradigm. In this context, the idea of positive mental health, happiness and well-being will be discussed.

The psychology of happiness and well-being fills the gaps in the area of stress and health by providing understanding how can we move beyond managing stress and achieve greater sense

of happiness, well-being, flourishing and a meaningful life. In this connection, this course will address the following questions-

What is happiness? What makes us happy? Do we really know what will make us happy?

Can we become happier? What are the barriers in achieving sustainable happiness?

Are there any evidence based happiness enhancing strategies/activities/interventions?

Is happiness sufficient for our well-being? Are there other dimensions of human well-being?

The nature of stress

Key concepts:

Why stress related problems is a global epidemic? Why is it important to understand the dynamics of stress in our life?

What is psychological stress? Is stress an environmental stimulus? Is it a reaction in our body and mind? Or is it an interaction between the person and the environment?

What are the mental processes involved in the stress response?

What are the different characteristics, types, and sources of stress?

Have you ever experienced the following symptoms before or after an event? (Symptoms of stress)

Forgetfulness, confusion

Inability to concentrate

Constant worrying

Irritability/moodiness

Loneliness/isolation

Sleeping too much or too little

Eating more or less

Procrastinating

Excessive drinking of alcohol or smoking or drugs.

Frequent cold/headache/chest pain

Stress: A global epidemic

WHO dubbed stress as the health epidemic of the 21st century.

In the context of America, stress is estimated to cost around 300 billion $ per year and there is an increase in the stress level of about 10-30% between 1983 to 2009 (Fink, 2017).

Recently, in 2019, a global well-being study conducted by Cigna corporation reported that about 82% Indians are suffering from stress on account of work, health and finance-related concerns which is higher than other developed and emerging countries such as the USA, UK, Germany, France and Australia.

The consequences of this rapid increase in the stress level could be devastating in multiple dimensions of our health, well-being and functioning such as physical and mental health, performance, productivity, quality of personal and social life etc. and accounting for a significant burden of disability within nations.

There may be multiple possible reasons behind the rise of stress and its related problems. One major cause could be rapidly changing world increasing challenges and demands.

Therefore, it is very important for all of us to understand the dynamics of stress in our life because of its far reaching implications to our health and quality of life. Without understanding the dynamics of stress in our life, we can not lead a productive and flourishing life.

Various perspectives on definition of stress

Although the word stress today is intuitively understood by most people, its precise definition is generally elusive. Nevertheless, it is commonplace to regard stress as undesirable and harmful to one's health and well-being (Harrington, 2013).

There have been many and varied attempts to define stress. We can divide these definitions into various categories. For example-

(1) Stimulus-based definitions of stress

Stimulus-based definitions define stress as an environmental stimulus which causes a strain reaction in the individual exposed to the stressful stimulus.

This type of definition came from the physics and engineering where a substance is said to be under the stress when an external load produces a distorting force inside the substance called strain.

Stress is viewed as a demand from the external environment.

"stress is that which happens to the man, not that which happens in him; it is a set of causes , not a set of symptoms" (Symonds, 1947) .

Stimulus based definitions are not in popular use now as researchers found such definitions as very narrow and limiting.

Response-based definition of stress

Response based definitions focus on the response to the stressful stimuli as the actual stress itself. The response is primarily viewed in terms of the physiological response patterns in the body as a result of stressful stimuli.

One of the most popular definition in this category is-
"stress is the non-specific response of the body to any demand made upon it" (Selye 1974).

Response-based definitions of stress are also no longer popular in use just like stimulus based definitions because of its limitations.

Interactional definition of stress

Interactional definition of stress was developed as a response to the shortcomings of the stimulus and response based definitions. Here stress is defined in terms of interaction between the environment (stimulus) and the person (response).

One of the most popular definition of stress in this category is proposed by Richard Lazarus and Susan Folkman (1984). It states that-
"stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being"

This definition is more process-oriented and takes account of the dynamic nature of the stress relationship between the person and the environment.

Contemporary researchers' views stress mostly in terms of interactional perspective.

This perspective look at stress as a subjective phenomenon which depends on the appraisals and perception of the individual

What is stress?

Stress is the experience or condition that results (anxious or threatening feelings) when we interpret or explain a situation being more than our coping resources can handle.

Stress=Perceived situation>Personal coping resources

Stress is an individual subjective experience

A given situation may be stressful for one person and not for another.

We are stressed by different kinds of things.

There is nothing wrong or bad to feel stressed in a situation when someone else doesn't.

What makes something as stressful?

The amount of stress each person experiences depends on his or her understanding/belief about a situation/event (dangerous, threatening etc.).

Different things are stressful for different people largely because-

The meaning of the event differs from person to person

People have different resources available for dealing with a stressful situation.

Cognitive appraisals of stress

Appraisals of stress explain how different individuals have different reactions to the same stimulus based on their mental interpretations of the stimulus.

Some may find an event/action as stressful, others may find exciting, and yet others may be unaffected.

This difference may result from differences in the appraisals of the event.

Lazarus's appraisal and coping model gives us more detail.

Lazarus's appraisal and coping model

Lazarus and Folkman (1984) proposed a three-process cognitive appraisals consisting of primary appraisal, secondary appraisal, and reappraisal.

Primary Appraisal: Here people judge a particular event/situation as positive or negative.

According to Lazarus, events can be appraised during primary appraisal in three possible ways. They can be seen as irrelevant, relevant but not threatening, or stressful.

Stressful reactions occur when the situation is judged as potentially involving harm-loss, threat, and/or challenge.

-Harm-loss appraisals are past or present oriented and result from appraisals of loss or damage that is happening or has already happened. The losses may include loss of money, job, or psychological loss such as loss of self-esteem.

-Threat appraisals are future oriented. When the future suggests the possibility of harm or loss, the person will experience threat.

-Challenge appraisals see the potential for gain or growth. Threat appraisals generally evoke negative emotions such as anxiety, fear, and anger, but challenge appraisals evoke feelings of excitement, eagerness, and exhilaration.

Secondary Appraisal: It occurs when a situation is judged as stressful and involves the evaluation of personal resources or ability to cope. E.g. An interview situation.

Coping processes will be discussed in detail in the upcoming lectures.

Stress Reappraisals: Here the stressful situation is reappraised based on ongoing feedback from the situation along with the person's self-assessment of how well he or she is dealing with the situation.

A reappraisal is simply an appraisal that follows an earlier appraisal in the same encounter and modifies it.

Module 1 (Lecture 2)

The Nature of Stress 2

Key Concepts:

Different characteristics of stress

Major types of stress

Sources of stress

Characteristics of stress

Stress is subjective and may be self created

People are not very objective in their appraisals of potentially stressful events. Some people are more prone to feel threatened by life's difficulties than others.

A large chunk of our stressful experiences could be self created by our pessimistic and maladaptive thought processes.

A large chunk of our sufferings are self created.

Stress is an everyday event

Many everyday events such as waiting in line, having car trouble, misplacing things etc. can be stressful and are called as daily hassles.

A major stressful events, such as divorce can trigger a cascade of many minor stressors such as taking new responsibilities.

Daily hassles may have significant negative effects on a person's mental and physical health (Delongis, Folkman, & Lazarus, 1988).

Stress can have an additive/cumulative effects

Research shows that minor daily hassles can be more strongly related to mental health than major stressful events (Kanner et al, 1981).

Many theorists believe that stressful events can have a additive or cumulative effects (Seta, seta, & McElroy, 2002).

This additive effects may have serious negative consequences when an individual experiences multiple stressors frequently in his/her life.

Stress may be influenced by culture

Culture includes shared ideas, beliefs, behaviors of a group.

The cultural background/norms of an individual could affect their experience of stress by influencing our appraisal/perception of an event.

Some studies suggests that the Japanese and Korean students seem to suffer greater exam stress than British suggests a possible cultural differences in beliefs lead to differences in the experience of exams as stressful (Colby, 1987).

Stress can have Spillover effect

Stress spillover refers to the process where stress in one domain, such as workplace spill over to create stress in another domain such as family relationships (Grzywacz, Almeida, & McDonald, 2002) such as marital satisfaction.

There can be positive spillover effect also. For example, positive emotions experienced at workplace can lead to positive mood and interactions with family members at home (Greenhaus & Powell, 2006).

Stress Contagion/Stress transfer

It refers to the process where one person's reaction to stress affects the health of a significant other such as spouse's depression affects one's well-being (Saxbe & Repetti, 2010).

In an interesting study by Waters, West, and Mendes (2014) found that mothers' stressful experiences are contagious to their infants and can reciprocally influence each other's physiological reactivity.

Major types of stress

Acute vs chronic stress

Acute stress: Stressors that have a relatively short duration and a clear end point. E.g., waiting for the result of a test.

Chronic stress: Stressors that have a relatively long duration without a clear end point. E.g., Poverty

Social Stressors

Social stressors can be divided into three major categories: Life events, chronic strains, and daily hassles (Carr & Umberson, 2013).

Life events are acute changes that require adjustment within a relatively short time period such as job loss. Unexpected (sudden death of loved one) and off-time (widowed prematurely) life events are more distressing (George, 1999).

Traumatic life events such as sexual assault are extremely stressful and may have long lasting effects.

Chronic stress/strain

Daily hassles: These are minor events that require adjustment throughout the day such as traffic jams.

Distress vs Eustress

Eustress is a positive stress that can be beneficial for us. For example, various challenges that puts pressure to grow, improve, achieve goals etc.

Distress is the negative stress that we generally refer to when we talk about stress.

Other sources of stress

Frustrations: It occurs in any situation in which the pursuit of some goal is thwarted such as traffic jams. (Weiten & Lloyd, 2007). Some frustrations such as failures and losses can be very stressful.

Psychologists John Dollard and colleagues (1939) proposed "Frustration-Aggression" hypothesis by suggesting that (a) frustration always produces an aggressive urge and (b) aggression is always the result of prior frustrations.

Conflicts: It occurs when two or more incompatible motivations compete for expression. (Weiten & Lloyd, 2007).

Kurt Lewin (1935) discussed three types of conflicts-

approach-approach-when one has to choose between two equally desirable but incompatible options. Eg., want to stay healthy and also want to eat unhealthy fatty foods.

Avoidance-avoidance-when one has to choose between two equally undesirable options. E.g., a patient with serious illness has to choose between having a traumatic surgery or long term therapy with unpleasant side effects.

Approach-avoidance-when there are desirable and undesirable factors within a single option. E.g., A person wants to go to the gym but also believes gym membership is unnecessary and extravagant expense.

Life changes: these are any noticeable changes in one's life circumstances that require readjustment.

Holmes and Rahe (1967) developed the social readjustment rating scale (SRRS) to measure life change as a form of stress. This scale included 43 major life events such as death of a spouse, divorce personal injury, retirement etc.

Interestingly, they also included positive events as a source of stress such as marriage.

Pressure: It involves expectations or demands that one behave in a certain way. There can be two types of pressures-the pressure to perform and the pressure to conform (Weiten & Lloyd, 2007).

One is under the pressure to perform when he/she is expected to perform tasks and responsibilities quickly, efficiently and successfully.

Pressure to conform involves pressure to follow others' expectations such as one is expected to follow parents values and rules.

Lecture 3 (Module 1)
Biology Of Stress

Key concepts:

Fight-or-flight response

General adaptation syndrome

Stress-brain-body pathways

Gender difference in stress response

The physiology of stress

Stressful experiences are associated with various physiological changes in the body. Some of these include the following-

The Fight-or-Flight Response

Walter cannon (1932) was the first person to describe body's reaction to stress in terms of fight-or-flight response.

It refer to physiological reaction of the body as a result to threat or stressor. It mobilizes and prepares body either for the fight (stand) or flight (run away) when confronted by a threat.

The Fight-or-Flight Response reaction occurs in the sympathetic division of the autonomic nervous system.

General Adaptation Syndrome (GAS)

Hans Selye, an endocrinologists studies changes in the body's physiology in reaction to stressors using rat as his subjects in 1950s.

He summarized body's short and long term reactions to stress as a three phased process termed as GAS.

Phase 1: *Alarm Reaction*. It occurs once a threat is recognized. Here essentially fight-or-flight response occurs resulting in physiological arousal to master resources to deal with the threat.

Phase 2: *Stage of Resistance*. If the stress continues, one enters this stage. Here the body tries to adapt to the stressor by making many changes in the body to reduce the effect of the stressor.

Phase 3: *Stage of Exhaustion*. If the stress is not resolved in the phase 2 and continues for a substantial amount of time, one may enter this stage. Here the body's resistance to the stress may gradually decrease or collapse quickly particularly by reducing immune functions. This may lead to "disease of adaptation" such as ulcers or high BP.

Stress-Brain-Body Pathways

The hypothalamus is the center of the brain in the context of stress response. It activates two pathways leading to release of stress hormones. These are-

The sympathetic adrenal medullary (SAM) system, which leads to the secretion of the two catecholamines-adrenaline (epinephrine) and noradrenaline (norepinephrine).

The hypothalamic pituitary adrenocortical (HPA) system, which leads to the secretion of corticosteroids such as cortisol.

In the SAM pathway, the Sympathetic NS activates adrenal medulla, which secretes the stress hormones catecholamines (adrenaline and noradrenaline) in the blood stream. Their release increases heart rate, blood pressure, release of glucose and fatty acids from the liver thus increasing energy in the body. This is a quick reaction (within a minute) and is significant for coping with acute stress.

In the HPA pathway, the hypothalamus activates anterior pituitary, which secretes adrenocorticotropic hormone (ACTH) in the blood stream which reaches the adrenal cortex which releases cortisol in the blood steam. Cortisol influences metabolism, storage of the fats and immune functions. This process is much slower (may take 30 minutes) and is significant for coping with chronic stress.

The bodily consequences of chronic stress response is different from the acute stress response. The chronic stress response adversely affects our physical health.

Stress and Brain

Stress, hippocampus, and pre-frontal cortex

Chronic release of stress hormone such as cortisol adversely influence two major areas of the brain i.e. pre-frontal cortex (executive functions such as working memory and decision making, regulating thoughts and emotions) and hippocampus (important in learning memory and emotions).

In a study by Justin B. Echouffo-Tcheugui and colleagues (2018) found that high level of blood cortisol was associated with poorer memory and cognitive functioning particularly for the women. It was also associated with lower total cerebral brain volume.

Chronic stress has a shrinking effect on the pre-frontal cortex

Stress hormones such as cortisol may adversely affect the functioning of pre-frontal cortex (executive functions such as working memory and decision making) by making structural changes such as neural atrophy in the region (Cook and Wellman, 2004).

Chronic stress also increases the activity of amygdala and make it hyperactive and may pre-dispose us to be in a constant state of fight-or flight.

Stress can disrupt synaptic regulation (brain cell connectivity)

It can disrupt synapse regulation (van der Kooij et al, 2014), resulting in the loss of sociability and the avoidance of interactions with others and memory.

They discovered an enzyme (MMP-9), when triggered by stress, that attacks a molecule in the hippocampus which is responsible for regulating synapses. When the synapses are modified, fewer neural connections are able to be made in the area.

Gender Difference in Stress Response

Fight-or-flight response may be a primary physiological response to stress. However, Taylor and colleagues (2000) reported that female's response to stress are more marked by a pattern called "Tend-and-befriend".

This theory suggests that under stress, females show more **tending** behavior by giving more attention to nurturant activities such as caring for the offspring and dependents to protect and reduce distress. They also show **befriending** behavior by creating and maintaining social network to aid in the process of protection and reducing distress.

The biological support for this theory partially comes from the “oxytocin” hormone (mainly produced in hypothalamus). Oxytocin is also released as a response to stress, but it is more influential among females. Oxytocin calms the females by reducing anxiety, and promotes affiliative behavior such as grooming, touching and bonding behavior.