Chapter 2

Literature review comprises locating, reading and evaluating reports of research as well as reports of causal observation and opinion that are related to the individuals planned research report. A study of relevant literature is an essential step to get a full picture of research studies and knowledge evolved with regard to the problem under study. This chapter brings a critical review of the available literature published in journals, books and websites. The investigator has made an attempt to bring a brief review of researches related to the present study to form the background for the present study and has presented the same under appropriate headings.

The mind-body relationship

"For this is the great error of our day that the physicians separate the soul from the body"

– Hippocrates

The assumption that mind has a connection with health is not new. The Ancient Greeks and Romans described associations between mind-body, and this presumptive link has since continued through medical folklore and even psychoanalytic theory. Hippocrates outlined the fundamentals of the treatment of diseases. In historic retrospect, since its beginnings, medical science has ascribed to the psychological and social factors a great and above all self-evident significance. In the earliest Assyrian and Babylonian civilizations it was stressed that disease might be a punishment for moral transgressions and the sick person was enjoined to indulge in severe soul-searching. The Ancient Greeks believed that the gods were both the cause of disease and also a source for their cure. The
Ancient Greek civilization’s first so-called hospital is usually considered to be Asclepius’ temple where the treatment consisted of what is referred to as incubation or temple sleep. The dreams that the sick person had during this incubation sleep were then analyzed and attention was drawn to disharmonies in the deep inner psychological world which were said to be the cause of the disease. The Greek physician Galen who settled and worked in Rome declared that disease was due to a disruption of the harmony in the body and soul (Taylor, 2005).

**Historical Overview**

Early cultures believed that disease arose when evil spirits entered the body and that these spirits could be exorcised through the treatment process. Archaeologists have found Stone Age skulls with small holes in them that are believed to have been made intentionally with sharp stone tools. This procedure, called trephination, allowed the evil spirits to leave the body while the “physician” or shaman, performed his treatment ritual (Taylor, 2005).

The Greeks were among the earliest civilizations to identify the role of bodily functioning in health and illness. Rather than ascribing illness to evil spirits, they developed a humoral theory of illness that was first proposed by Hippocrates and later expanded by Galen. According to this view, disease arises when the four circulating fluids of the body – blood, black bile, yellow bile, and phlegm are out of balance. The function of treatment is to restore balance among the humours. Specific personality types were believed to be associated with bodily temperaments in which one of the four humors predominated. In essence, then, the Greeks ascribed disease states to bodily factors, but believed that these factors could also have an impact on the mind.
The view begins to change with the rise of modern psychology, in particular, with Sigmund Freud’s (1856-1936) early work on conversion hysteria. The work of Flanders Dunbar and Franz Alexander gave the idea that an individual’s internal conflicts can produce specific illnesses. In the late eighteenth and early nineteenth centuries, medical researchers and practitioners believed most illness were produced by organic factors but that a few particular disorders were psychosomatic ie, physical disease caused by psychological factors (Taylor, 2005).

**Early work on psychosomatic disorders**

One of the earliest formal discussions of psychosomatic disorders emerged from Freud’s work on “conversion – hysteria”. According to Freud, specific unconscious conflicts can produce particular physical disturbances that symbolize the repressed psychological conflicts. In conversion hysteria, the patient converts the conflict into a symptom via the voluntary nervous system., he/she then becomes relatively free of the anxiety the conflict would otherwise produce (Cameron, 1963).

In some of Freud’s reported cases, the disturbance produced was a biological impossibility. For example: glove anesthesia, in which only the hand (but not other parts of the arm) loses sensation, was one common conversion reaction. This disorder cannot be organically caused, because the neural pathways that conduct sensations to and from the hand also serve the rest of the arm. Thus, the psychosomatic basis for such disorders seems to be quite clear.
The idea that specific illnesses are produced by individuals’ internal conflicts was perpetuated in the work of Flanders Dunbar in the 1930s and Franz Alexander in the 1940s. Unlike Freud, however, both these researchers linked patterns of personality to specific illness rather than to a single specific conflict. Thus, for example: Alexander developed a profile of the ulcer-prone personality for those, whose disorder was caused primarily by excessive needs for dependency and love.

A more important departure from Freud concerned the physiological mechanism that was postulated to account for the conflict-disorder link. Whereas Freud maintained that conversion reactions occur via the voluntary nervous system with no necessary physiological changes, Alexander and Dunbar argued that conflicts produce anxiety that becomes unconscious and takes a physiological toll on the body via the autonomic nervous system: the continual physiological changes eventually produce an actual organic disturbance. Thus, in the case of the ulcer patient, repressed emotions resulting from frustrated dependency and love seeking needs increase the secretion of acid in the stomach, eventually eroding the stomach lining and producing ulcers. A third and most important departure from Freud’s early position concerned the recognition that psychosomatic disorders can and do produce actual tissue damage. That is, whereas Freud posited that unconscious conflicts were directly manifested in symptoms but were not mediated by actual somatic changes, psychosomatic researchers like Dunbar and Alexander recognized that man disorders with roots in psychological conflicts can produce substantial tissue damage (Bahnson, 1974, Leigh and Reiser, 1977).

Dunbar’s and Alexander’s work helped to shape the field of psychosomatic medicine by offering profiles of several common
psychosomatic disorders: ulcers, hyperthyroidism, rheumatoid arthritis, essential hypertension, neurodermatitis (a skin disorder), colitis, and bronchial asthma. Thus, for eg: respiratory disorders such as bronchial asthma were regarded as expressions of dependency, especially needs for protection. The suppression of rage and hostility was suggested as a cause of essential hypertension. In the 1930s and 1940s, a number of clinicians attempted to integrate Freudian ideas into a growing body of knowledge concerning the bodily aspects of emotional experiences. During this period the psychosomatic hypothesis became popular. According to this theory, bodily symptoms can be caused by blocking of emotional expressions (Sarason, 1996).

Today most researchers look at physical symptoms from an interactional viewpoint: Bodily defects may cause psychological problems, and psychological problems may in-turn, cause bodily defects. It is now known that physical heath is inextricably interwoven with the psychological and social environment: all conditions of health and illness, not just the diseases identified but the early psychological and social factors. The treatment of illness and prognosis for recovery are substantially affected by such factors as the relationship between patient and practitioner and expectations about pain and discomfort. Staying well is heavily determined by good health habits, all of which are under one’s personal control, by such socially determined factors as stress and social support. The mind – body cannot be meaningfully separated in matters of health and illness. An adequate understanding of what keeps people healthy or makes them get well is impossible without knowledge of the psychological and social context within which health and illness are experienced (Taylor, 2005).
The idea that the mind and the body together determine health and illness logically implies a model for studying these issues. This model is called bio-psychosocial model. The bio-psychosocial model’s fundamental association is that any health or illness outcome is a consequence of the interplay of biological, psychological and social factors. The bio-psychosocial model maintains that biological, psychological and social factors are all important determines of health and illnesses. As such, both macro-level processes such as the existence of social support, the presence of depression etc. and micro-level processes such as cellular disorders or chemical imbalances interact to produce a state of health or illness. The bio-psychosocial model maintains that health and illness are caused by multiple factors and produce multiple effects. The model further maintains that the mind and body cannot be distinguished in matters of health and illness because both so clearly influence an individual’s state of health. The bio-psychosocial model emphasizes health and illness rather than regarding illness as a deviation from some steady state (Taylor, 2005).

Bio-psychosocial problems often arise when people’s lives are disrupted by environmental changes, challenges, and constraints. At present most researchers and clinicians believe that, for any given individual, a host of variables- physical, psychological, and social- contribute to the phenomenon that we call “getting sick”. The idea that illness is due simply to the influence of external agents seems outmoded. While it is true that there are individual differences in the vulnerability of bodily organs to disease, these differences must be considered in the light of personality characteristics, environmental factors, and the general condition of the body (Sarason, 1996).
Several groups of physical disorders in which personality and social factors may play a part have been studied over the years. The term psychophysiological disorders/psychosomatic disorders have traditionally been applied to physical conditions in which psychologically meaningful events are closely related to bodily symptoms. Psychophysiological disorders might be thought as end products of bio-psychosocial processes. A large number of physical problems have been studied from a psychophysiological standpoint. These include disorders of the cardiovascular, respiratory, gastrointestinal, musculoskeletal, and genitourinary systems, skin as well as cancer (Sarason, 1996).

**Life style disorders**

Lifestyle diseases (also sometimes called diseases of longevity or diseases of civilization) are diseases that appear to increase in frequency as countries become more industrialized and people live longer. They can include Alzheimer's disease, atherosclerosis, asthma, Male Pattern Baldness, cancer, chronic liver disease or cirrhosis, Chronic Obstructive Pulmonary Disease, Type 2 diabetes, heart disease, metabolic syndrome, Crohn's disease nephritis or chronic renal failure, osteoporosis, stroke, depression and obesity (Steyn et al, 1992).

**Top 10 Lifestyle Diseases**

- **Alzheimer's disease**: a form of brain disease. No one knows the exact cause, but a real breakdown of the cells of the brain does occur. There is no treatment, but good nutrition may slow the
progress of this lifestyle disease, which lasts about seven years in most people who have it.

- **Arteriosclerosis**: A generic term for several diseases in which the arterial wall becomes thick and loses elasticity. Atherosclerosis is the most common and serious vascular disease. Plaques deposited in the walls of arteries are major causes of heart disease, chest pain (angina pectoris), heart attacks, and other disorders of the circulation. In atherosclerosis yellowish plaques of cholesterol, fats, and other remains are deposited in the walls of large and medium-sized arteries. Atherosclerosis usually occurs with aging. It is linked to overweight, high blood pressure, and diabetes.

- **Cancer**: diseases characterized by uncontrolled, abnormal growth of cells. Cancer is definitely considered the number one ‘disease of civilization’. There are more than 150 different kinds of cancer and many different causes.

- **Chronic Liver Disease/Cirrhosis**: any of a group of liver disorders. Characteristics of liver disease are jaundice, loss of appetite, liver enlargement, fluid accumulation, and impaired consciousness.

- **Chronic Obstructive Pulmonary Disease (COPD)**: a disease characterized by slowly progressing, irreversible airway obstruction. The symptoms are problems in breathing while exercising, difficulty in breathing in or out deeply, and sometimes a long-term cough. The condition may result from chronic bronchitis, emphysema, asthma, or chronic bronchiolitis. Cigarette smoking and air pollution make it worse.
- **Diabetes**: a disease affecting sugars used by the body. There are four main types of diabetes mellitus. Type I diabetes is also called insulin-dependent diabetes, juvenile-onset diabetes, brittle diabetes, or ketosis-prone diabetes. Type II diabetes is also called non-insulin-dependent diabetes, adult-onset diabetes, ketosis-resistant diabetes, or stable diabetes. Type II often develops in overweight adults. Type III, or gestational diabetes, occurs in some women during pregnancy. Type IV includes other types of diabetes are linked to disease of the pancreas, hormonal changes, side effects of drugs, or genetic defects.

- **Heart Disease**: any of several abnormalities that affect the heart muscle or the blood vessels of the heart. There are a couple dozen forms of this lifestyle disease. Heart disease and other forms of cardiovascular disease can lead to congestive heart failure, a condition in which the heart cannot pump sufficient blood to meet the demands of the body. The various forms of heart disease may also cause disturbances in normal heartbeat, called arrhythmia.

- **Nephritis/CRF**: any disease of the kidney marked by swelling and abnormal function. Characteristics of kidney disease are bloody urine, persistent protein in urine, pus in urine, edema, difficult urination, and pain in the back.

- **Stroke**: a condition due to the lack of oxygen to the brain that may lead to reversible or irreversible paralysis. Stroke is linked to advanced age, high blood pressure, previous attacks of poor circulation, cigarette smoking, heart disorders, embolism, family
history of strokes, use of birth-control pills, diabetes mellitus, lack of exercise, over-weight, high cholesterol, and hyperlipidemia. (Meng et al, 1999)

**Life-Style Disorders – Indian Scenario**

Modern science through improved sanitation, vaccination, and antibiotics, and medical attention has eliminated the threat of death from most infectious diseases. This means that death from lifestyle diseases like heart disease and cancer are now the primary causes of death. Too many people are dying relatively young from Heart Disease and Cancer and other lifestyle diseases in modern times.

The World health Organization (WHO) has identified India as one of the nations that is going to have most of the lifestyle disorders in the near future. Nowadays, not only are lifestyle disorders becoming more common, but they are also affecting younger population. Hence, the population at risk shifts from 40+ to maybe 30+ or even younger. Already considered the diabetes capital of the world, India now appears headed towards gaining another dubious distinction - of becoming the lifestyle-related disease capital as well. A study conducted jointly by the All India Institute of Medical Sciences and Max Hospital shows the incidence of hypertension, obesity and heart disease is increasing at an alarming rate, especially in the young, urban population. A sedentary lifestyle combined with an increase in the consumption of fatty food and alcohol is to blame cases of obesity, diabetes, hypertension etc (India development gateway, 2011).

In our study, we are focusing on the cardiovascular diseases and cancer and the psychological, lifestyle and socio-demographic factors leading to the incidence and prognosis of these diseases.
CARDIOVASCULAR DISEASES

“Every affection of the mind that is attended
with either pain or pleasure, hope or fear,
is the cause of an agitation whose influence extends to the heart.”

- William Harvey, 1626

Cardiovascular diseases: clinical picture

The term “Cardiovascular diseases” refers to a range of pathological conditions that are related to the functioning of heart and blood vessels. The various diseases that fall under the umbrella of cardiovascular disease include coronary heart disease (heart attacks), cerebrovascular disease (stroke), raised blood pressure (hypertension), peripheral artery disease, rheumatic heart disease, congenital heart disease and heart failure.

ICD classifications of cardiovascular diseases

I00-I99 - Diseases of the circulatory system
<table>
<thead>
<tr>
<th>ICD CODES</th>
<th>Classifications</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I00-I02</td>
<td>Acute rheumatic fever</td>
</tr>
<tr>
<td>I05-I09</td>
<td>Chronic rheumatic heart diseases</td>
</tr>
<tr>
<td>I10-I15</td>
<td>Hypertensive diseases</td>
</tr>
<tr>
<td>I20-I25</td>
<td>Ischemic heart diseases</td>
</tr>
<tr>
<td>I26-I28</td>
<td>Pulmonary heart disease and diseases of pulmonary circulation</td>
</tr>
<tr>
<td>I30-I52</td>
<td>Other forms of heart disease</td>
</tr>
<tr>
<td>I60-I69</td>
<td>Cerebrovascular diseases</td>
</tr>
<tr>
<td>I80-I89</td>
<td>Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified</td>
</tr>
<tr>
<td>I95-I99</td>
<td>Other and unspecified disorders of the circulatory system</td>
</tr>
</tbody>
</table>

**Common types of cardiovascular diseases**
• Coronary artery disease

Fig 2
Coronary artery disease

Coronary artery diseases are diseases of the arteries that supply the heart muscle with blood. Sometimes known as CAD, coronary artery disease is the leading cause of heart attacks. It generally means that blood flow through the coronary arteries has become obstructed, reducing blood flow to the heart muscle. The most common cause of such obstructions is a condition called atherosclerosis, a largely preventable type of vascular disease. Coronary artery disease and the resulting reduced blood flow to the heart muscle can lead to other heart problems, such as chest pain (angina) and heart attack (myocardial infarction).
Heart attack (Myocardial infarction)

Myocardial infarction (MI) or acute myocardial infarction (AMI), commonly known as a heart attack is the interruption of blood supply to part of the heart, causing heart cells to die. This is most commonly due to occlusion (blockage) of a coronary artery following the rupture of a vulnerable atherosclerotic plaque, which is an unstable collection of lipids (fatty acids) and white blood cells (especially macrophages) in the wall of an artery. The resulting ischemia (restriction in blood supply) and oxygen shortage, if left untreated for a sufficient period of time, can cause damage or death (infarction) of heart muscle tissue (myocardium).
Cardiomyopathy, which literally means "heart muscle disease," is the deterioration of the function of the myocardium (i.e., the actual heart muscle) for any reason. People with cardiomyopathy are often at risk of arrhythmia or sudden cardiac death or both. Some types of cardiomyopathy are genetic, while others occur for reasons that are less well understood. Types of cardiomyopathy include ischemic, which is caused by loss of heart muscle from reduced coronary blood flow., dilated, which means the heart chambers are enlarged., hypertrophic, which means the heart muscle is thickened., and idiopathic, which means the cause is unknown. One of the most common types of cardiomyopathy is idiopathic dilated cardiomyopathy - an enlarged heart without a known cause.
A congenital heart defect (CHD) is a defect in the structure of the heart and great vessels which is present at birth. Congenital heart disease refers to a form of heart disease that develops before birth (congenital). Congenital heart disease is a broad term and includes a wide range of diseases and conditions. These diseases can affect the formation of the heart muscle or its chambers or valves. They include such conditions as narrowing of a section of the aorta (coarctation) or holes in the heart (atrial or ventricular septal defect). Some congenital heart defects may be apparent at birth, while others may not be detected until later in life.
Heart failure, often called congestive heart failure, is a condition in which the heart can't pump enough blood to meet the needs of the body's organs and tissues. It doesn't mean the heart has failed and can't pump blood at all. With this less effective pumping, vital organs don't get enough blood, causing such signs and symptoms as shortness of breath, fluid retention and fatigue. "Congestive" heart failure is technically reserved for situations in which heart failure has led to fluid buildup in the body. Not all heart failure is congestive, but the terms are often used interchangeably. Heart failure may develop suddenly or over many years. It may occur as a result of other cardiovascular conditions that have damaged or weakened the heart, such as coronary artery disease or cardiomyopathy.
An aneurysm or aneurism is a localized, blood-filled dilation (balloon-like bulge) of a blood vessel caused by disease or weakening of the vessel wall. Aneurysms most commonly occur in arteries at the base of the brain (the circle of Willis) and in the aorta (the main artery coming out of the heart, an aortic aneurysm). As the size of an aneurysm increases, there is an increased risk of rupture, which can result in severe hemorrhage, other complications or even death. Aneurysms usually get bigger over time. Because of that, they have the potential to rupture and cause life-threatening bleeding. Aneurysms can occur in arteries in any location in your body. The most common sites include the abdominal aorta and the arteries at the base of the brain.
Valvular heart disease is any disease process involving one or more of the valves of the heart (the aortic and mitral valves on the left and the pulmonary and tricuspid valves on the right). Valve problems may be congenital (inborn) or acquired (due to another cause later in life). Treatment may be with medication but often (depending on the severity) involves valve repair or replacement (insertion of an artificial heart valve). Valves may be damaged by a variety of conditions leading to narrowing (stenosis), leaking (regurgitation or insufficiency) or improper closing (prolapse). The patient may be born with valvular disease, or the valves may be damaged by such conditions as rheumatic fever, infections (infectious endocarditis), connective tissue disorders, and certain medications or radiation treatments for cancer.
• **Pericardial diseases**

Fig 9

Pericardial diseases

Pericardial diseases are diseases of the sac that encases the heart (pericardium). Pericardial disorders include inflammation (pericarditis), fluid accumulation (pericardial effusion) and stiffness (constrictive pericarditis). These can occur alone or together. The causes of pericardial disease vary, as do the problems they may lead to. For instance, pericarditis can occur after a heart attack and, as a result, lead to pericardial effusion or chest pain.

• **Arrhythmias**

Fig 10

Arrhythmias
Heart rhythm problems (arrhythmias) occur when the electrical impulses in heart that co-ordinate heartbeats don't function properly, causing heart to beat too fast, too slow or irregularly. Other forms of cardiovascular disease can cause arrhythmias.

- **Ischemic heart disease (IHD)**

Ischaemic or ischemic heart disease (IHD), or myocardial ischaemia, is a disease characterized by ischaemia (reduced blood supply) to the heart muscle, usually due to coronary artery disease (atherosclerosis of the coronary arteries). Its risk increases with age, smoking, hypercholesterolaemia (high cholesterol levels), diabetes, and hypertension (high blood pressure), and is more common in men and those who have close relatives with ischaemic heart disease. Symptoms of stable ischaemic heart disease include angina (characteristic chest pain on exertion) and decreased exercise tolerance. Unstable IHD presents itself as chest pain or other symptoms at rest, or rapidly worsening angina. Diagnosis of IHD is with an electrocardiogram, blood tests (cardiac markers), cardiac stress testing or a coronary angiogram. Depending on the symptoms and risk, treatment may
be with medication, percutaneous coronary intervention (angioplasty) or coronary artery bypass surgery (CABG).

- **High blood pressure**

Fig 12

High blood pressure

![Blood pressure is the measurement of force applied to artery walls](image)

High blood pressure (hypertension) is the excessive force of blood pumping through blood vessels. It's perhaps the most common form of cardiovascular disease. Although potentially life-threatening, it's one of the most preventable and treatable types of cardiovascular disease. High blood pressure also causes many other types of cardiovascular disease, such as stroke and heart failure.
A stroke occurs when blood flow to the brain is interrupted (ischemic stroke) or when a blood vessel in the brain ruptures (hemorrhagic stroke). Both can cause the death of brain cells in the affected areas. Stroke is also considered a neurological disorder because of the many complications it causes. Other forms of cardiovascular disease, such as high blood pressure, increase risk of stroke.
Peripheral arterial disease and claudication

Peripheral arterial disease is a disorder in which the arteries supplying blood to limbs - usually the legs - become narrowed or blocked. When this happens, legs receive less blood than they need to keep up with demand. Claudication may then develop as the disease progresses and arteries become more obstructed, and have pain or cramping in legs (Heart and Stroke Foundation, 2011).

CANCER

*Cancer is a word, not a sentence.*

- John Diamond, 1996

Cancer is an emotional word, a word associated with disease, death and dying. It is a word which strikes fear into the hearts of ordinary people, because, for centuries, it has been associated with a mysterious illness with no known cause and no known cure. However, during the past 20 years the
situation has been transformed, our understanding of the underlying disorder has improved enormously and effective treatments have been evolved for several kinds of cancer (Kenneth Calman and John Paul, 1978).

**Cancer: clinical picture**

Cancer (medical term: malignant neoplasm) is not a single disease but a group of different diseases sharing a common pattern of destructive, uncontrolled cellular growth. Cancer is a class of diseases in which a group of cells display uncontrolled growth (division beyond the normal limits), invasion (intrusion on and destruction of adjacent tissues), and sometimes metastasis (spread to other locations in the body via lymph or blood). These three malignant properties of cancer differentiate malignant tumours from benign tumours, which do not grow uncontrollably, directly invade locally, or metastasize to regional lymph nodes or distant body sites like brain, bone, liver, or other organs.

**Fig 15**

*Cancerous cells splitting apart*
**Stages of cancer**

Cancer stage refers to the extent or severity of the cancer, based on factors such as the location of the primary tumour, tumour size, number of tumours, and lymph node involvement (spread of cancer into lymph nodes).

Staging is important for several reasons:

- Staging helps the doctor plan the appropriate treatment.
- The stage can be used to estimate the person’s prognosis.
- Knowing the stage is important in identifying clinical trials that may be suitable for a particular patient.
- Staging helps health care providers and researchers exchange information about patients, it also gives them a common terminology for evaluating the results of clinical trials and comparing the results of different trials.

Staging is based on knowledge of the way cancer progresses. Cancer cells grow and divide without control or order, and they do not die when they should. As a result, they often form a mass of tissue called a tumour. As the tumour grows, it can invade nearby tissues and organs. Cancer cells can also break away from the tumour and enter the bloodstream or the lymphatic system. By moving through the bloodstream or lymphatic system, cancer cells can spread from the primary site to lymph nodes or to other organs, where they may form new tumours. The spread of cancer is called metastasis.
The following are the stages of cancer (National Cancer Institute, 2011)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>Carcinoma in situ.</td>
</tr>
<tr>
<td>Stage I</td>
<td>Higher numbers indicate more extensive disease: Larger tumour size and/or spread of the cancer beyond the organ in which it first developed to nearby lymph nodes and/or organs adjacent to the location of the primary tumour.</td>
</tr>
<tr>
<td>Stage II &amp; III</td>
<td></td>
</tr>
<tr>
<td>Stage IV</td>
<td>The cancer has spread to another organ(s).</td>
</tr>
</tbody>
</table>

**Tumour grade**

Tumour grade is a system used to classify cancer cells in terms of how abnormal they look under a microscope and how quickly the tumour is likely to grow and spread. Many factors are considered when determining tumour grade, including the structure and growth pattern of the cells. The specific factors used to determine tumour grade vary with each type of cancer.

- **Histologic grade**, also called differentiation, refers to how much the tumour cells resemble normal cells of the same tissue type.
- **Nuclear grade** refers to the size and shape of the nucleus in tumour cells and the percentage of tumour cells that are dividing.

If a tumour is suspected to be malignant, a doctor removes a sample of tissue or the entire tumour in a procedure called a biopsy. A pathologist examines the tissue to determine whether the tumour is benign or malignant. The pathologist can also determine the tumour grade and identify other characteristics of the tumour cells.
Based on the microscopic appearance of cancer cells, pathologists commonly describe tumour grade by four degrees of severity: Grades 1, 2, 3, and 4. The cells of Grade 1 tumours resemble normal cells, and tend to grow and multiply slowly. Grade 1 tumours are generally considered the least aggressive in behaviour. Conversely, the cells of Grade 3 or Grade 4 tumours do not look like normal cells of the same type. Grade 3 and 4 tumours tend to grow rapidly and spread faster than tumours with a lower grade.

The American Joint Committee on Cancer (2002) recommends the following guidelines for grading tumours:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX</td>
<td>Grade cannot be assessed (Undetermined grade)</td>
</tr>
<tr>
<td>G1</td>
<td>Well-differentiated (Low grade)</td>
</tr>
<tr>
<td>G2</td>
<td>Moderately differentiated (Intermediate grade)</td>
</tr>
<tr>
<td>G3</td>
<td>Poorly differentiated (High grade)</td>
</tr>
<tr>
<td>G4</td>
<td>Undifferentiated (High grade)</td>
</tr>
</tbody>
</table>

**ICD classifications of cancer**

<table>
<thead>
<tr>
<th>ICD CODES</th>
<th>Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>C00-C97</td>
<td>Malignant neoplasms</td>
</tr>
<tr>
<td>C00-C75</td>
<td>Malignant neoplasms, stated or presumed to be primary, of specified sites, except of lymphoid, haematopoietic and related tissue</td>
</tr>
<tr>
<td>C00-C14</td>
<td>Lip, oral cavity and pharynx</td>
</tr>
<tr>
<td>C15-C26</td>
<td>Digestive organs</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>C30-C39</td>
<td>Respiratory and intrathoracic organs</td>
</tr>
<tr>
<td>C40-C41</td>
<td>Bone and articular cartilage</td>
</tr>
<tr>
<td>C43-C44</td>
<td>Skin</td>
</tr>
<tr>
<td>C45-C49</td>
<td>Mesothelial and soft tissue</td>
</tr>
<tr>
<td>C50</td>
<td>Breast cancer</td>
</tr>
<tr>
<td>C51-C58</td>
<td>Female genital organs</td>
</tr>
<tr>
<td>C60-C63</td>
<td>Male genital organs</td>
</tr>
<tr>
<td>C64-C68</td>
<td>Urinary tract</td>
</tr>
<tr>
<td>C69-C72</td>
<td>Eye, brain and other parts of central nervous system</td>
</tr>
<tr>
<td>C73-C75</td>
<td>Thyroid and other endocrine glands</td>
</tr>
<tr>
<td>C76-C80</td>
<td>Malignant neoplasms of ill-defined, secondary and unspecified sites</td>
</tr>
<tr>
<td>C81-C96</td>
<td>Malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic and related tissue</td>
</tr>
<tr>
<td>C97</td>
<td>Malignant neoplasms of independent (primary) multiple sites</td>
</tr>
<tr>
<td>D00-D09</td>
<td>In situ neoplasms</td>
</tr>
<tr>
<td>D10-D36</td>
<td>Benign neoplasms</td>
</tr>
<tr>
<td>D37-D48</td>
<td>Neoplasms of uncertain or unknown behaviour</td>
</tr>
</tbody>
</table>
Common types of cancer

- Ovarian cancer

**Fig 16**

Ovarian cancer

Ovarian cancer is a cancerous growth arising from the ovary. Symptoms are frequently very subtle early on and may include: bloating, pelvic pain, difficulty eating and frequent urination, and are easily confused with other illnesses. Most (more than 90%) ovarian cancers are classified as "epithelial" and are believed to arise from the surface (epithelium) of the ovary. However, some evidence suggests that the fallopian tube could also be the source of some ovarian cancers. Since the ovaries and tubes are closely related to each other, it is thought that these fallopian cancer cells can mimic ovarian cancer. Other types may arise from the egg cells (germ cell tumour) or supporting cells. These cancers are grouped into the category of gynecologic cancer.
Cervical cancer is malignant neoplasm of the cervix uteri or cervical area. One of the most common symptoms is abnormal vaginal bleeding, but in some cases there may be no obvious symptoms until the cancer is in its advanced stages. Human papillomavirus (HPV) infection is a necessary factor in the development of almost all cases of cervical cancer. Most cervical cancers are squamous cell carcinomas, arising in the squamous (flattened) epithelial cells that line the cervix. Adenocarcinoma, arising in glandular epithelial cells is the second most common type. Very rarely, cancer can arise in other types of cells in the cervix.
Endometrial cancer refers to several types of malignancies that arise from the endometrium, or lining, of the uterus. The most common subtype, endometrioid adenocarcinoma, typically occurs within a few decades of menopause, is associated with excessive estrogen exposure, often develops in the setting of endometrial hyperplasia, and presents most often with vaginal bleeding. Endometrial carcinoma is the third most common cause of gynecologic cancer death (behind ovarian and cervical cancer). Endometrial cancer may sometimes be referred to as uterine cancer. However, different cancers may develop not only from the endometrium itself but also from other tissues of the uterus, including cervical cancer, sarcoma of the myometrium, and trophoblastic disease.
• **Breast Cancer**

**Fig 19**

Breast Cancer

Breast cancer (malignant breast neoplasm) is cancer originating from breast tissue, most commonly from the inner lining of milk ducts or the lobules that supply the ducts with milk. Cancers originating from ducts are known as ductal carcinomas, those originating from lobules are known as lobular carcinomas.

• **Bladder cancer**

**Fig 20**

Bladder cancer
Bladder cancer refers to any of several types of malignant growths of the urinary bladder. It is a disease in which abnormal cells multiply without control in the bladder. The bladder is a hollow, muscular organ that stores urine. It is located in the pelvis. The most common type of bladder cancer begins in cells lining the inside of the bladder and is called transitional cell carcinoma.

- **Lung Cancer**

  ![Lung Cancer](image)

  Lung cancer is a disease which consists of uncontrolled cell growth in tissues of the lung. This growth may lead to metastasis, which is the invasion of adjacent tissue and infiltration beyond the lungs. The vast majority of primary lung cancers are carcinomas of the lung, derived from epithelial cells.
Colorectal cancer

Fig 22
Colorectal cancer

Colorectal cancer, also called colon cancer or large bowel cancer, includes cancerous growths in the colon, rectum and appendix. Colorectal cancers arise from adenomatous polyps in the colon. These mushroom-shaped growths are usually benign, but some develop into cancer over time. Most colon cancers are adenocarcinomas (cancers that begin in cells that make and release mucus and other fluids). Most of those who die of the disease suffer from metastases - tumours that spread from the primary bowel tumour to the liver, pelvic organs, or lungs. Colorectal cancer affects men and women with nearly equal frequency. Cancers of the colon and rectum usually arise from growths called polyps. Only a small fraction of polyps become cancerous, and most grow so slowly that most people are unaware of them.
• **Kidney (Renal Cell) Cancer**

Fig 23

Kidney (Renal Cell) Cancer

Kidney (Renal Cell) Cancer is the cancer that forms in tissues of the kidneys. Kidney cancer includes renal cell carcinoma (cancer that forms in the lining of very small tubes in the kidney that filter the blood and remove waste products) and renal pelvis carcinoma (cancer that forms in the center of the kidney where urine collects). It also includes Wilms tumour, which is a type of kidney cancer that usually develops in children under the age of 5.

• **Non-Hodgkin Lymphoma**

Fig 24

Non-Hodgkin Lymphoma
The non-Hodgkin lymphomas (NHLs) are a diverse group of blood cancers that include any kind of lymphoma except Hodgkin's lymphomas. Types of NHL vary significantly in their severity, from indolent to very aggressive. Lymphomas are types of cancer derived from lymphocytes, a type of white blood cell.

- **Melanoma**

  **Fig 25**

  Melanoma

  Melanoma cells are found predominantly in skin, but are also found in the bowel and the eye. Melanocytes are normally present in skin, being responsible for the production of the dark pigment melanin.

- **Thyroid Cancer**

  **Fig 26**

  Thyroid Cancer
Thyroid cancer is a thyroid neoplasm that is malignant. Occasionally, symptoms such as hoarseness, neck pain, and enlarged lymph nodes do occur in people with thyroid cancer.

- **Leukemia**

  Fig 27

  Leukemia

  Leukemia is a cancer of the blood or bone marrow characterized by an abnormal increase of white blood cells. Leukemia is a broad term covering a spectrum of diseases. In turn, it is part of the even broader group of diseases called hematological neoplasms.

- **Pancreatic cancer**

  Fig 28

  Pancreatic cancer
Pancreatic cancer (exocrine cancer) is a disease in which malignant (cancer) cells are found in the tissues of the pancreas.

- **Brain cancer**

  **Fig 29**

  ![Brain cancer](image)

  Brain cancer is a disease of the brain in which cancer cells (malignant) arise in the brain tissue. Cancer cells grow to form a mass of cancer tissue (tumour) that interferes with brain functions such as muscle control, sensation, memory, and other normal body functions. Tumours composed of cancer cells are called malignant tumours, and those composed of non-cancerous cells are called benign tumours. Cancer cells that develop from brain tissue are called primary brain tumours while tumours that spread from other body sites to the brain are termed metastatic brain tumours (Henderson et al., 2000).

**Gender and health issues**

Health problems are a major concern for many women, and they become an increasingly central force as women grow older. According to estimates, more than 80% of women who are 55 or older experience at least
one chronic health problem (Meyerowitz & Weidner, 1998). In the developed world, women today have a longer life expectancy and lower mortality rates than men at all ages, but epidemiological studies show that women report more chronic disease and disability (Khoury & Weisman, 2002). Women show higher rates of depression and anxiety related mood disorders. They do not show greater rates of mania, which can be classified as a disorder of unregulated positive affect (Kessler et al, 1994).

During the past decade, numerous studies have shown the positive effects of multiple role involvements on women’s physical and mental wellbeing (Barnett & Baruch, 1985). The more roles a woman fulfills, the better physical health, higher life satisfaction and less depression she may experience. Multiple roles are beneficial, but the quality and combination of roles can sometimes have a negative influence on a women’s life. Many roles drain energy and this may result in conflict and have a negative influence on well-being. Family roles are regarded as women’s core roles, and success in the roles of wife and mother has been considered fundamental for psychological well-being and thought to be less stressful than the worker role. Wife roles can often be in conflict with mother roles and this can lead to distress. In today’s modern society, declaring the distribution of roles between both genders, but not deriving either from its natural or assumed roles, may actually assist women and men in participating in both family and work lives without expressing a great degree of role stress.

The differences in men’s and women’s roles and expectations within the family mean that family and work conflicts influence women and men in different ways. Women often encounters stress because of the increased burden of doing the work associated with their multiple roles as employee,
wife and mother (Moen & YU, 2000). Although changes in gender roles have resulted in a more equitable distribution of house-hold work that equity disappears when family includes children (Lundberg, 1998). Women carry out the great majority of child care responsibilities makes their work load larger than men’s. Thus, women who have employment and child care responsibilities make their work lad larger than men’s. Thus, women who have employment and child care obligations experience more stress than women without children (Lueckcn et al, 1997). In a variety of ethnic groups, conflict over house hold work is both common and a source of stress (Stohs, 2000). The positive or negative effects of work and family roles depend on the resources people have available (Taylor et al., 2008). Both men and women are affected by partner and family support, but women’s health is more strongly affected by these resources of stress (Walen & Lachman, 2000). Therefore, filling multiple obligations is not necessarily stressful for women, but low control and poor social support for multiple roles can produce stress.

**Gender and cardiovascular diseases**

Gender is a risk factor for CVD, with men at elevated risk to develop CVD before age 65. The hormone estrogen plays some role in protecting pre-menopausal women from CVD, but this inherent difference is not the only factor producing the difference. If hormone eves are the only reason, then the gender differences would apply to all times and societies. The current gender discrepancy is a fairly recent development. The gender gap was much smaller during the 1800s, began to widen during the 1920s and has now begun to decrease (Nikiforov & Mamaev, 1998). These changes suggest factors other than biology are involved in this gender differences (Weidner, 2000).
Many people think that heart disease is a man’s illness, but that myth is not correct. Men experience heart disease an average of 10 years earlier than women do, but women run the same risk by the time they reach 60 years of age (Chrisler, 2001). A study that investigated the components of muscularity and femininity as they related to risk of heart attack (Helgeson, 1990), negative masculinity (such as aggression and hostility) was related to heart attack severity for both men and women.

Gender-specific changes in Quality of Life (QOL) following cardiovascular disease (CVD) were studied in 208 patients to determine whether gender-related differences in post-morbid QOL result from differences in disease severity, premorbid QOL, or different CVD-related recovery. Results showed that females had worse QOL at all three post-morbid assessments compared to males. However, multivariate analyses adjusting for premorbid gender differences and disease severity showed no significant gender-related differences for physical and psychological functioning. Therefore, gender differences in QOL following CVD mainly result from premorbid differences in QOL, age, comorbidity, and disease severity at the time of diagnosis, and do not appear to be the consequence of gender-specific recovery (Van Jaarsveld, 1994).

Lifestyle factors such as smoking and eating a high-fat diet are risk factors to cvd, and more men and women smoke and eat diets high in fat. However, lifestyle factors alone do not account for gender differences in CVD. In a study that statistically adjusted for lifestyle factors (Fried et al, 1998), men are still about twice as likely to experience CVD as women. Therefore, gender differences in CVD risk remains poorly understood.
Women traditionally have been underrepresented in clinical trials with poor enrollment, and information for prevention and treatment of coronary heart disease (CHD) is extrapolated from populations of men. In addition to biologic risk factors for CHD, psychosocial risk factors have also been studied more in men than women. Both traditional coronary and psychosocial risk factors are reviewed as to how they uniquely affect women. A comprehensive approach, encompassing life-style changes, coping strategies and pharmacologic interventions for both prevention and treatment of CHD in women are emphasized (Sara Mobasseri et al., 2003).

Gender and cancer

Linda Titus-Ernstoff et al., (2002) studied the role of early life factors in a large, population-based, case-control study of breast cancer risk in postmenopausal women. Case women in Massachusetts, New Hampshire, and Wisconsin were ascertained through state cancer registries., control women were randomly selected from drivers license lists (50–65 years of age) or Medicare beneficiary lists (65–79 years of age). Information concerning factors of interest was obtained through structured telephone interviews. Overall, 83 % of eligible cases and 78% of eligible controls participated, and data from more than 2900 women were available for this analysis. They observed a weak J-shaped relationship between birth weight and breast cancer risk, the increased risk was not statistically significant for either the lowest or the highest birth weight. Parental smoking during the pregnancy was not associated with risk of breast cancer in the adult daughter. Breast cancer risk increased significantly with father’s education. Risk also increased with greater age of the mother at the time of the subject’s birth. The subject’s birth rank was inversely associated with risk, as was the number of older sisters, but the number of older brothers, number
of younger siblings, siblingship gender ratio, and total siblingship size were unrelated to risk. Overall, these results are consistent with previous studies and suggest that these early life factors have a modest influence on breast cancer risk in postmenopausal women.

A case-control study was carried out at the Federal University Hospital, Belo Horizonte, Brazil, to determine if selected socio-economic and reproductive risk factors for breast cancer differed between pre-menopausal and post-menopausal women. Cases were 300 women with breast carcinoma and controls were 600 women with other benign diseases matched for age and date of diagnosis, admitted to the same hospital during the same period (1978-1987). Multivariate analysis showed no differences in breast cancer risk in pre- and post-menopausal women (risk factors were similar in direction and magnitude). Occupation, irregular menstrual cycles, parity, history of breast cancer in at least one first-degree female relative, and oral contraceptive use had similar associations in both groups. The present study indicates that breast cancer diagnosed before and after menopause has a similar risk profile (Ana Lucia, 2001).

It has been hypothesized that prenatal exposure to maternal estrogens may be a risk factor for breast cancer in the offspring. In two recent studies, maternal estradiol levels in the first pregnancy have been compared to those in the second, and in both studies levels were higher in the first pregnancy. If both the hypothesis and the reported findings were true, women born as their mother's second child would be expected to have lower risk for breast cancer than first-born women. Data from 1,468 cases of breast cancer and 4,175 hospital controls from three previously published studies were modeled through multiple logistic regression to evaluate this possibility. The size of the woman's sibling-ship was not
related to breast cancer risk. On the other hand, second-born women had, as predicted, lower breast cancer risk than first-born women, although the difference was nominally significant only among premenopausal women. The relative risk for breast cancer, contrasting second-born to first-born women, and the corresponding 95 per cent confidence intervals, were 0.71 (0.54–0.94) among premenopausal women, 0.94 (0.76–1.17) among postmenopausal women, and 0.86 (0.73–1.02) among all women, controlling for menopausal status (Chung-Cheng Hsieh, 1991).

Psychological factors leading to cardiovascular disease and cancer

PERSONALITY

Personality refers to an individual's enduring and pervasive personal motivation, emotion, interpersonal style, attitudes and behaviour that are stable over a long time after young adulthood. Personality is the dynamic organization within the individual of those psychological systems that determine his unique adjustment to his environment. This definition emphasizes:

- That is constantly evolving and changing as a motivational and self-regulating aspect.
- That it is neither inclusively mental nor exclusively neural, it operates from both body and mind.
- The psycho-physical systems have motivational force for the full range of social and environmental factors.
- That the way in which the individual learns to adjust is unique.
That the individual behaviour includes a great amount of spontaneous creative behaviour towards environment involving mastery as well as passive adaptation (Allport, 1948).

**Big Five factor theory of Personality**

The origins of the Five factor model can be traced to William McDougall’s proposal that personality could be broadly conceptualized as being composed of five factors. Not long after, Louis Leon Thurstone used factor analysis to reduce 60 trait adjectives down to five factors. Gordon Allport and H. S. Odbert identified 18,000 terms in an English dictionary that could be used to describe an individual, later reducing this list to 4,000 words. Approximately 10 years later, Raymond Cattell condensed this list to 35 clusters, with 12 underlying dimensions. Cattell and his colleagues added 4 more dimensions to these 12 and developed the Sixteen Personality Factor Questionnaire (16 PF). In the 1960s, two psychologists, Ernest C. Tuples and Raymond E. Christal, used Cattell’s scales in a study of Air Force trainees. Their analysis of the data suggested the presence of five broad factors. Warren Norman replicated these five factors in 1963 and they became known as the “Norman Five.” Despite their convergence on five factors, these works remained relatively unnoticed until the late 1970s and early 1980s when several lines of independent research sparked renewed interest. Among these were studies conducted by Robert R. McCrae and Paul T. Costa, Jr., whose names have since become synonymous with the FFM or Big Five model of personality structure. Building upon the work of their predecessors, Costa and McCrae developed the NEO Personality Inventory (NEO PI) to measure the five traits. Although many different measures of the FFM have been developed, Costa and McCrae’s NEO Personality Inventory-Revised (NEO PI-R) remains the
most widely used and researched. Although five-factor theory is still in its infancy, it was formulated on the basis of a large body of empirical literature on the development of personality. The theory readily accounts for the stability of personality observed in numerous studies. Cross-cultural studies also lend support to the theory (McCrae and Costa, 2004).

Personality researchers have proposed that there are five basic dimensions of personality. Evidence of this theory has been growing over the past 50 years, beginning with the research of D. W. Fiske and later expanded upon by other researchers including Norman, Smith, Goldberg, and McCrae and Costa.

The "big five" are broad categories of personality traits. These five categories are usually described as follows:

1. **Extraversion**: This trait includes characteristics such as excitability, sociability, talkativeness, assertiveness, and high amounts of emotional expressiveness.

2. **Agreeableness**: This personality dimension includes attributes such as trust, altruism, kindness, affection, and other pro-social behaviours.

3. **Conscientiousness**: Common features of this dimension include high levels of thoughtfulness, with good impulse control and goal-directed behaviours. Those high in conscientiousness tend to be organized and mindful of details.

4. **Neuroticism**: Individuals high in this trait tend to experience emotional instability, anxiety, moodiness, irritability, and sadness.

5. **Openness**: This trait features characteristics such as imagination and insight, and those high in this trait also tend to have a broad range of interests.
<table>
<thead>
<tr>
<th>The Big Five Factors</th>
<th>The 30 Personality Facets that make up each Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness to Experience</td>
<td>Imagination</td>
</tr>
<tr>
<td></td>
<td>Artistic Interests</td>
</tr>
<tr>
<td></td>
<td>Depth of Emotions</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>Sense of Competence</td>
</tr>
<tr>
<td></td>
<td>Orderliness</td>
</tr>
<tr>
<td></td>
<td>Sense of Responsibility</td>
</tr>
<tr>
<td>Extraversion</td>
<td>Warmth</td>
</tr>
<tr>
<td></td>
<td>Gregariousness</td>
</tr>
<tr>
<td></td>
<td>Assertiveness</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>Trust in others</td>
</tr>
<tr>
<td></td>
<td>Sincerity</td>
</tr>
<tr>
<td></td>
<td>Altruism</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>Anxiety</td>
</tr>
<tr>
<td></td>
<td>Angry Hostility</td>
</tr>
<tr>
<td></td>
<td>Moodiness/Contentment</td>
</tr>
</tbody>
</table>

These dimensions represent broad areas of personality. Research has demonstrated that these groupings of characteristics tend to occur together in many people. For example, individuals who are sociable tend to be talkative. However, these traits do not always occur together. Personality is
a complex and varied and each person may display behaviours across several of these dimensions. Of the Big Five Personality Traits, neuroticism is linked to negative affect and extraversion to positive affect. Agreeableness and conscientiousness are slightly correlated with positive affect and slightly negatively correlated with negative affect. Openness to experience is slightly positively correlated with both negative and positive affect (Watson and Clark, 1992).

Jasna Hudek-Knezevic et al., (2009) examined how 5-factor personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) and three higher-order health-related personality constructs (negative experience, optimistic control, and passivity) are related to self-reports of subjective health outcomes (positive and negative mood, physical symptoms, and general health concern) and objective health conditions (chronic illnesses, serious illnesses, and physical injuries).

McCrae & Costa (2004) carried out a study on a sample of 822 healthy volunteers (438 women and 384 men, from 18 to 84 years). Three health-related personality constructs significantly predicted all subjective health measures above and beyond five factor personality dimensions. Out of the five factor personality dimensions, neuroticism was most consistently related to worse subjective health outcomes, while out of three health-related personality constructs, negative experience was related to worse and optimistic control to better subjective health outcomes. When objective health conditions were taken into account as criterion variables, both sets of variables were relatively weak predictors. Only five factor personality traits as a group of variables significantly predicted chronic illnesses. Only neuroticism significantly predicted the presence of chronic illnesses,
whereas only optimistic control was related to more frequent physical injuries caused by accidents. Women, high levels of Neuroticism, Extraversion, and Openness have been linked to less healthy habits, whereas high levels of Agreeableness and Conscientiousness have been linked to healthier attitudes and behaviours.

**Personality and illness**

The scientific exploration of links between behaviour and health is a relatively young venture. Even ‘classic’ studies identifying a link between smoking and disease were conducted only in the 1950s and much relevant research is more recent. This research has had three primary foci. The first has been the link between behaviours, such as smoking or eating habits that confer risk of disease, indirectly. Smoking, for example may cause disease as a result of the carcinogens inhaled. The behaviour repertoire associated with smoking is not in itself harmful. A second set of research has focused on behaviours that directly moderate risk of disease. This includes exercise, but perhaps more excitingly from a psychological perspectives has also included individual differences, including Type A and C behaviour. A third strand of research has focused on elements of the social support or psychological environment that influence disease rates, including social support and socioeconomic status. The later, in particular has recently emerged as an extremely important area of research (Paul Bennett, 2000).

Personality traits have emerged as important predictors of all-cause mortality. Although perhaps the best known of these predictors is low conscientiousness, high neuroticism and low extraversion have also been associated with an elevated mortality risk (Almada et al., 1991., Danner,
Researchers have found that personality traits are linked to health. For example, low levels of conscientiousness in childhood and poor mental health in adulthood are related to dying at earlier ages from diseases, such as heart diseases and cancer (Friedman et al., 1995).

Pamela et al., (1999) examined the role of personality in the reporting of symptoms and illness not supported by underlying pathology. After assessment of the Big Five personality factors, 276 healthy volunteers were inoculated with a common cold virus. On each of the following 5 days, objective indicators of pathology, self-reported symptoms, and self-reported illness onset were assessed. Neuroticism was directly associated with reports of unfounded (without a physiological basis) symptoms in individuals at baseline and post-inoculation in those with and without colds. Neuroticism was also indirectly associated with reports of unfounded illness through reports of more symptoms. Openness to Experience was associated with reporting unfounded symptoms in those with verifiable colds, whereas Conscientiousness was associated with reporting unfounded illness in those who were not ill.

Several personality variables have been identified as potential predictors of health (Smith & Ruiz, 2002., Weibe & Smith, 1997). Furthermore, there are certain personality variables, such as optimism, anger and hostility that predict health and have significant gender differences (Stoney & Engebreston, 1994). Personality has been hypothesized to influence health differences in three ways: Cognitive.
appraisal of the health event, the choice of health behaviours and life styles and physiological hyper responsiveness to stress (Weibe & Smith, 1997).

People offer different kinds of explanations for the positive and negative events that occur in their world. For example: someone with an internal, stable, and global explanatory style is likely to attribute a negative event to some long lasting personal inadequacy that applies in lots of situations. Explanatory style is linked to physical health and susceptibility to stress and contributes to depression. People who consistently make internal, stable and global attributions for negative events have been found to suffer from increased stress related health problems in mid-life as well as later in life (Kamen-Siegel et al., 1991., Peterson et al., 1987).

Explanatory style may be linked to a personality characteristic such as optimism- the belief that good things will happen which some psychologists have argued is a relatively enduring trait that changes little over a life time (Scheier and Carver, 1993).

Optimistic patients who received heart transplants reported more positive emotions and dealt between with set backs than patients with a pessimistic outlook (Leedham et al, 1995). Weibe & Smith (1997) found that optimists reported lower stress levels and decreased psychosomatic symptoms.

Hardiness is a personality factor that functions to decrease the chances of developing psychosomatic symptoms and to increase protection against the harmful and physiologically arousing effects of stress (Wiebe & Smith, 1997). Hardiness is a combination of three traits – control, commitment and challenge – that protect or buffer us from the potentially
harmful effects of stressful situations and reduce our chances of developing psychosomatic diseases / illness.

People with disease – prone personalities are often characterized as neurotic (Booth – Kewley and Vickers, 1994), maladjusted (Bernard and Belinsky, 1993) pessimistic (Scheier and Carver, 1987) and having low self esteem (Campbell, Chew and Scratchley, 1991) and an external locus of control (Birkimer, Lucas and Birkimer, 1991). In contrast, self healing individuals are described as hardy (Priel, Gonik and Rabinowitz, 1993) optimistic (Scheirer and Carver, 1993), extraverted (Amirkhan, Risinger and Swickert, 1995), Conscientious (Friedman et. al 1993, 1995) and as having an internal locus of control (Quadrel & Lau, 1989) and believing in a just world (Tomaka and Blascovich, 1994).

In a study of subjects with an external cause of control perceived situations as uncontrollable, which led to increased level of stress that were associated with significantly more psychosomatic symptoms (they developed more physical illnesses). In comparison, subjects with an internal locus of control appraised situations as less stressful and developed fewer psychosomatic symptoms (Stern et. al, 1982).

Though genetic factors explain some of the difference in the effects of stress (Kessler et al. 1992), Friedman, Hawley and Tucker (1994) present evidence from a large number of studies indicating a difference between disease prone respond to stressful situations with negative emotions and unhealthy behaviour patterns, resulting in illness and a shorter life span. At the opposite extreme are self healing individuals, who deal effectively with stress and resist, illness. They are found to be enthusiastic about life,
emotionally balanced, alert, responsive, energetic, curious, secure and constructive – people everyone one likes to be around.

The connection between personality and illness is not a one way street, illness can affect one’s personality, too (Cohen and Rodriguez, 1995). Individuals who suffer from serious illness and disability often experience high levels of anxiety, depression, anger and hopelessness. And as Sarason and Sarason (1984) have pointed out, even minor health problems, such as the flu or a backache, produce temporary negative thoughts and feelings. Medical patients who overcome their negative thoughts and feelings can speed their recovery.

**Personality and cardiovascular diseases**

Research has revealed that a particular type of people (Type A behaviour) who are aggressive, always short of time, short tempered and stressful are much prone to develop heart disease. Most of the young heart patients of modern day have Type A behaviour (Chhaju, 1997). People classified as Type A, compared to Type B individuals, have higher blood pressure (Contrada, 1989), produce less HDL—the “good cholesterol” and are twice as likely to suffer from heart disease (Weidner, Istvan and Mcknight, 1989).

Personality styles have also been implicated in immune – related disease, and are believed to activate changes in the autonomic nervous system and neuroendocrine functioning. The most well known of these theories is Type A behaviour pattern which has been independently associated with incidence of heart disease in numerous prospective studies. Classic symptoms include hurried manner and speech, eating while doing
other things, impatience and behaving in an over assertive manner (Rosenman, 1996).

It now appears that anger is the critical component that leads to coronary disease and other health problems (Fekken and Jakubowski, 1990, Smith and Pope, 1990), so the term hostile Type A increasingly used by health psychologists.

The distressed personality (Type D) is an emerging risk factor in cardiovascular disease (CVD) that incurs a risk on par with left ventricular dysfunction in patients with ischemic heart disease. Type D is defined as the co-occurring tendencies to experience increased negative emotions and to inhibit self-expression in social interactions. Evidence is accumulating that Type D may also be a risk factor for adverse outcome across CVD patient groups, including patients undergoing revascularization with drug-eluting stent implantation or bypass surgery, patients with heart failure, peripheral arterial disease, and arrhythmia. In these patient groups, Type D personality has been associated with a 2-5 fold increased risk of adverse prognosis, impaired quality of life and symptoms of anxiety and depression independent of traditional biomedical risk factors, including disease severity. Although little is known about the pathways responsible for the detrimental effects of Type D on clinical outcome, the immune system and health-related behaviours, such as smoking and noncompliance, are likely candidates (Pedersen., Susanne., Denollet., Johan, 2006).

Denollet and De Potter (1992) had identified a discrete personality type that may predispose patients with CHD to adverse health outcomes. Cluster analysis of their results yielded a personality subtype coronary patients who tended to experience negative emotions (ie. higher score on
negative affectivity) and simultaneously tended to inhibit self-expression (ie. high score on social inhibition). This provided the basis of using negative affectivity and social inhibition as definitions of the ‘distressed personality type or Type D (Denollet et al., 1995).

**Personality and cancer**

The role of personality factors in the development of cancer had been suspected for centuries. In psycho-oncology, the concept of a "cancer-prone personality" has gained some attention. The cancer – prone person is described as inhibited, over socialized, confirming, compulsive, and depressive. He/she is said to have particular trouble expressing tension, anger and anxiety, instead presenting the self as pleasant, calm, compliant, and passive (Bahnson, 1981). Bahnson (1981) proposed that cancer patients use particular defense mechanisms and express their emotions abnormally. In particular, cancer patients may cope with stressful events through denial and repression. Type C behaviour has been independently described by Greer and Morris (1975) and Temoshak (1985). It is defined as an aggravate of several coping styles, in particular being stoic, cooperative, appeasing, unassertive and inexpressive of negative emotions, particularly anger. It is thought to be linked to the development of cancer. In essence, ‘Type C’ individuals are individuals who are co-operative and unassertive, who tend to suppress negative emotions (particularly anger) and who accept/comply with external authorities.

A number of studies have shown an association between Type C and the incidence and progression of cancer. Studies have supported some Type C tendencies. For example, one study enabled significant identification of cervix cancer patients, as compared with controls, on the basis of high
defensiveness and extraversion scores (Kreitler, Levavi and Bornstein, 1996). Of the Type C components, defensiveness was related to shorter survival (Rateliffe, Dawson and Wailer, 1995) as well as to a particular personality type whose major characteristics are dealing with loss by despair and retaining closeness to people with whom one’s relationship has ended (Grossarth-Maticck, Kanazir, Schmidt, and Velter, 1985).

Longitudinal studies have also shown Type C characteristics to predict cancer. Shaffer et al., (1987), followed 972 physicians for a 30 year period and found that participants characterized by high levels of ‘acting out’ and emotional expression had less than 1 % risk of developing cancer. Participants characterized as ‘loners’ and thought to inhibit emotional expression were 16 times more likely to develop cancer than those in this group.

A quasi-prospective study of 2163 women attending breast-screening clinics (and controls), indicates that there is a link between personality factors and breast disease. Certain aspects of Type A behaviour seem to be associated with breast-disease states (Brian Faragher and Cary Cooper, 1900).

Individual differences have an important role in modulating the relationship between environmental events such as stressors and the immune system, and stable individual differences such as personality may have an important influence not only on immunity but on the progression of chronic health problems such as cancer. However, the relationships among personality, the immune system, and health especially cancer, are controversial. Looking back to another controversy may help inform future research in this area: In the 1960s, Walter Mischel questioned whether
stable personality traits existed. Responses to this challenge included research designs that improved reliability and accounted for both person and situation in an interactionist model. Both responses are relevant to current research in personality, immunity, and health (Suzanne Segerstrom, 2002).

**Repression of emotions and cancer**

Suppression of emotion is the most widely investigated of the Type C tendencies. The studies of this tendency have yielded mixed results. Fox (1998) reported that five of the main studies supported the tendency, four did not support it, and three had mixed findings. Furthermore, the apparent non emotionality in cancer patients may be due to their intention to suppress emotions as part of their effort to appear others rather than to an authentic alexithymia (Servaes, Vingerhoets, Vergdenhil, Keuning and Broekhuijsen, 1999).

Suppression of negative effect, excessive conformity, severe stress, and lack of social support predict a poorer medical outcome from cancer (Spiegal and Moore, 1997).

Moreover, comparing the repressiveness of women before and after a biopsy for breast cancer and for non-relevant control surgery showed that before surgery all women had a comparable level of repressiveness (measured by high defensiveness and low anxiety) but that after surgery there was significant rise in the repressiveness of only those women who are given the diagnosis of cancer (reflecting a rise in defensiveness to combat anxiety) (Kreiter, Kreitler, and Chaitchik, 1993).
Of particular interest is evidence that repressors tend to experience difficulties in interpersonal functioning. They seem to be preoccupied with issues of relatedness and troubled by feelings of dependency and ambivalence in their reactions with others. These people, who are said to have ‘repressive’ personality, are characterized by their tendency to chronologically defend themselves against negative effects, particularly anger and anxiety, and to deny that they are distressed (Derakshan and Eysench, 1997., Emmons, 1992). Other psychological characteristics are undoubtedly involved since repression is just one of the several characteristics of the so called “cancer-prone” or type C personality (DeClemente and Temoshok, 1981., Kneier and Temoshok, 1984., Temoshok, 1987., Temoshok and Fox, 1984., Temoshok et al., 1985).

Cancer patients with a repressive coping style also have a poorer prognosis for treatment compared to patients with a non-repressive coping style. In addition to having a repressive coping style, Type C individuals are unassertive, helpless, and avoid interpersonal conflict (Knier and Temoshok, 1984).

Greer and Morris (1975) have found that women who suppressed their anger or had a confirming personality were more likely to have malignant changes than those without these characteristics. A life long history of anger suppression, which might be considered as the repression of anger, is another characteristic of breast cancer patients.

**Pessimism and cancer**

Pessimism has been linked to a number of health indicators. Pessimistic cancer patients were found to be more likely to die during a
follow up period compared with less pessimistic counter parts (Schulz, Bookwala, Knapp, Scheier and Williamson, 1996).

Accordingly, pessimism (Schultz et al., 1996) and introversion (Hislop et al., 1987) have also been associated with poor prognosis in patients been diagnosed with cancer. Patients were more likely to die during the next eight months if they had a pessimistic attitude toward treatment and recovery from cancer (Kawachi et al., 1994).

Studies of cancer patients have shown that perceived control and a sense of helplessness are strong predictors of recurrence of the disease and death. Similarly, low perceived control has been implicated in cardiovascular disease (Shapiro et al., 1996). Although a sense of control often does not reverse the course of a disease, atleast in its final stages, perceived control has been linked to individual’s adjustment to disease and overall quality of life.

Although there has been a lack of consensus on this issue, some suggested that the traits of neuroticism and extroversion might be associated with increased cancer vulnerability (Aarstad et al., 2002). Yet a number of recent studies have found no association between personality and cancer (Hansen et al., 2005., Nakaya et al., 2003).

**Personality: cardiovascular diseases and cancer**

Though his initial studies, revolved around CHD patients, Denollet (1998) later noted that the rate of cancer was 13% for men who had identified with a distressed personality (Type D personality) and 2% for those with non-type D personality. This led him to conclude that type D
personality was a prognostic factor for the development of cancer in women with established CHD.

Evidence suggests that cancer and coronary heart disease (CHD) may have common causes. John Denollet (1998) examined the role of pessimism, anxiety and personality in the development of cancer among men who had been diagnosed with CHD but were free of cancer at baseline. Two hundred and forty-six men who were treated for CHD, but were free of cancer, filled out psychological scales at baseline. Patients and their families were contacted after 6–10 years to determine the incidence of cancer. At follow-up, 12 patients (5%) had been diagnosed with cancer (9 cancer deaths). Development of cancer was unrelated to cardiac pathology but was associated with age (56 years), poor exercise tolerance, pessimism and anxiety. The rate of cancer was 13% for men with a distressed personality (type-D) and 2% for non-type-D men, rate of cancer death was 10% and 2%, respectively. Type-D refers to the interaction between high negative affectivity and high social inhibition. Regression analysis yielded older age and type-D as independent prognostic factors for cancer. Type-D personality was a prognostic factor for the development of cancer in men with established CHD. Psychosomatic research should take a broad enough view of the specific and the global psychosocial variables that may play a role in both cancer and CHD.

Deborah Wistow et al., (1990) devised a technique to combine physicians' ratings of health symptoms and diseases on four health factors which were entitled stress, cardiovascular disease, life-style and cancer. Factor scores from the four health factors were correlated with the Eysenck Personality Questionnaire in order to test Eysenck's theory. The results tended to support previous research in that a negative relationship was
found between neuroticism and cancer, and a positive relationship was found between neuroticism, stress-related symptoms, and cardiovascular symptoms. These variables only accounted for a small amount of the variance however. No support was found for the hypothesized relationship of extraversion to cardiovascular disease or to cancer. This study found that the dimensions of cardiovascular disease symptoms and cancer symptoms were positively correlated.

Grossarth-Maticek et al., (2007) reported that an individual's level on a rationality/anti emotionality (R/A) personality was strongly predictive of cancer, ischemic heart disease and stroke mortality. They conducted a population-based cohort study to investigate the relationships of an individual's level on the R/A personality to cancer and cardiovascular disease mortality in Japan. The results revealed that males scoring in the middle level compared to those scoring in the lower level of the R/A personality scale decreased their risk of death from cancer and cardiovascular diseases after controlling for covariates. The level on the R/A personality scale may affect mortality from cancer and cardiovascular diseases differently in Japan.

A sample of male and female subjects (age 28-74) responded to questionnaires including scales for personality, life style, work stress as well as questions on prevalent disease. A follow-up regarding self-reported incidence of cardiovascular disease and cancer is reported. During a mean follow-up of 10 years, 257 participants had died. Of those alive, N = 4.010 (82%) participated in the follow-up. Of these, 120 and 180 persons reported incident cardiovascular disease and cancer, respectively. The incidence of cardiovascular disease could be significantly predicted by the personality factors “Emotional Lability”, “Behavioural Control” and “Type-A-
Behaviour” as well as by the “Rationality/ emotionality”-scale. After controlling for age, gender and smoking behaviour only the significant effect of “Emotional Lability” remained. Cancer could not be predicted by any personality factors (Manfred Amelang et al., 2004., Manfred Amelang., Petra Hasselbach and Til Sturmer , 2004).

Sanderman and Ranchor (1997) described the role of personality in the onset and course of coronary heart disease (CHD) and cancer. When the role of personality as an aetiologic factor in the onset of disease is considered, the overall conclusion is that the evidence supporting this notion is generally weak. Only for hostility a consistent but weak association with CHD is found across studies. Even then, the results are not equivocal and several limitations of the conducted studies complicate firm statements. Specifically with respect to cancer, the prospective studies reviewed do not lend support for a causal role of personality in the onset of cancer. Related to the course of both CHD and cancer, it is more evident that personality, or variables closely related to personality, shows a relation to either survival or symptoms. It is interesting to see that there is some evidence supporting the influence of the non-expression of emotions under the condition of distress. In fact a taxonomy proposed by Denollet et al., (1996) resembles the Type C cancer personality trait. Both traits are linked to higher scores on neuroticism and introversion. In the discussion some possible pathways linking personality and disease are described. These models illustrate the need to carry out prospective studies focused on a broad range of personality variables and disease relevant behaviour and biological markers.
DEPRESSION

Depression is recognized as a serious public health concern in developing countries. The Global Burden of Disease study showed that depression will be the single leading cause of Disability Adjusted Life Years by 2020 in the developing world. Vaillant (1998) found that of 237 healthy men followed for a period of 55 years, 45% of those who had experienced a depressive episode, at or before their baseline measurement were dead at follow-up. This compared with 5% of those who reported good mental health.

Depression and cardiovascular diseases

Literature and folk wisdom have long linked depression and death however, only recently have scientific studies examined the relation between them. Beginning in the 1970s, investigators compared mortality among patients treated for major depression and the general population. Investigations revealed the strong association between depression and cigarette smoking, which made obvious a need to control for smoking. The first study to do this appeared in 1993, and not only did a relation between depression and mortality persist but a relation between depression and the development of ischemic disease was revealed. In the past 2 years, six more community surveys have followed populations initially free of disease, and five have observed an increased risk of ischemic heart disease among depressed persons. Another research strategy is to start with subjects who have preexisting cardiovascular disease. Here, too, depression has consistently been associated with a worse outcome. In one well-designed study, patients with depression in the period immediately after a myocardial infarction were 3.5 times more likely to die than non depressed patients.
The basis of this association remains speculative. However, it is likely that the changes in the autonomic nervous system and platelets that are seen in depression account for a substantial portion of the association (Alexander et al., 1998).

Depression may also be considered a risk factor for developing cardiac disease (Avery and Winokur, 1976., Pratt et al., 1996., Anda et al., 1993). Carvey (1990), Schrifler et al. (1989) found that up to one fifth of patients with coronary heart disease may have concomitant major depression.

Blell et al., (2006) examined the relative contribution of variance shared by depression, anxiety, and anger (negative effect) and the variance unique to each negative affective disposition in predicting cardiac autonomic function as indexed by heart rate variability (HRT). The sample included 653 community volunteers (51.0% female, 15.8% Black) ages 30-54. The negative affect explains the common effects of psychosocial risk factors for CVD on cardiac autonomic function with unique aspects of depression and anger related independently to reduced and increased vagal modulation of heart rate, respectively. These findings underscore the importance of examining multiple negative affective dispositions in the same analysis to differentiate the elements of these traits that are specifically cardio toxic.

Viola Vaccarino et al., (2007) measured C-reactive protein (CRP) and interleukin (IL)-6 in 559 women with suspected coronary ischemia who completed the Beck Depression Inventory (BDI) at baseline and were followed over 5.9 years. They considered indicators of past and current depression to classify women into 3 groups:
1) depression, having both elevated depressive symptoms and a previous diagnosis of depression requiring treatment, 
2) possible depression, having either indicator but not both., and 
3) no depression, having neither indicator of depression. 

The main outcome was incidence of CVD events (hospital stays for nonfatal myocardial infarction, stroke, congestive heart failure, and CVD-related mortality). Compared with women without depression, women with depression had a 70 % higher CRP and a 25 % higher IL-6 whereas women with possible depression had 30 % higher CRP and 28 % higher IL-6. Depression was a significant predictor of CVD but possible depression was not. Adjustment for other patient factors did not substantially affect the results. Addition of CRP decreased the estimate for depression by 13 %., and addition of IL-6 decreased it by 4 %. Both depression and inflammatory biomarkers remained independent predictors of outcome.

Pao-Luo et al., (2006) explored the association of hypertension and psychiatric morbidity in patients with end-stage renal disease (ESRD) under adjusted personality characteristics and parental attachment. Ten of the 40 males and 21 of the 49 females had high scores and were allotted to the case group (n = 31). The remaining 58 patients constituted the control group. The results showed that hypertension was strongly associated with depressive vulnerability. It revealed that gender difference and hypertension directly influenced the individuals' mental health status and that the influence of hypertension on mental health was highly variable. The hypertension could have an important effect on depression in ESRD patients, when predisposing factors, such as personality characteristics and parental attachment, gender, duration of hemodialysis and other medical diseases were adjusted. Hence, hypertension might be a mediating factor of
depressive vulnerability in ESRD patients’ underlying genetic and environmental problems.

Frasure-Smith et al., (1993) found three robust predictors of mortality in the 6 months following hospitalization: degree of left ventricular damage, previous MI and depression. Depression was the strongest predictor of reinfarction, with an adjusted hazard ratio of 4.29, contrasting with 3.52 for ventricular damage, and 3.2 for a history of MI.

Gonzalez et al., (1996) found that depression is more prevalent in patients with coronary artery disease (CAD) than in the general, elderly population. They administered structured psychiatric diagnostic interviews to 99 in-patients with CAD and diagnosed 23% with a major depressive episode (MDE) by DSM-IV criteria. Severity of medical illness and family history of psychopathology were indicators for increased risk for MDE. CAD patients with depression have higher mortality rates and depression is often not recognized and treated in these patients. These findings may facilitate the recognition of CAD patients at greater risk for MDEs.

Smith and Frohm (2000) investigated depression in the hospital after myocardial infarction (MI) has been associated with a substantial increase in the long term risk of cardiac mortality. Their results suggest in addition to the survival risks associated with post- MI depression, there are increased health care costs linked to both readmissions and outpatient contacts among depressed patients who survive the first post MI year. The extent to which the increased use of healthcare may have reduced depression and enhanced survival remains unclear.
Malotra, Tesar and Granco (2000) point out that the expanding scientific evidence supports a long recognized link between CVD and depression. As an independent risk factor, depression increases patient vulnerability to both the cardiac events and mortality. Several important pathophysiologic mechanisms have been proposed, including hypothalamic-pituitary axis hyperactivity, ANS dysfunction, and increased platelet reactivity among others. The recently completed Sertralic Antidepressant Heart Attack Randomized Trial inaugurates a series of studies intended to address the impact of antidepressant therapy on cardiovascular risk.

Hippisley-Cox, Fielding and Pringle (1998) showed that the risk of ischemic heart disease was three times higher among men with a recorded diagnosis of depression than among controls of the same age. This association persisted when smoking status, diabetics, hypertension, and under privileged area score were included in a multivariate model. Men with depression within the preceding 10 years were three times more likely to develop ischemia heart disease than were the controls. Men with ischemic heart disease had a higher risk of subsequent depression than men without ischemic heart disease. Depression was not a link factor for ischemic heart disease in women on multivariate analysis. They concluded that the depression might be an independent risk factor for ischemic heart disease in men, but not in women.

Ketterer, Mahr and Goldberg (2000) reviews the nature of the scientific evidence necessary to accept an etiological or aggravating role for psychological events. Epidemiological research over the past decade indicated that major depression and depressive symptomatology are common among patients with coronary heart disease (CHD) and post-
myocardial infarction. Major depression is a serious, comorbid disorder that can significantly increase risk for and complicate recovery from cardiac events (eg: myocardial infarction).

Penninx et al., (2001) showed that depression increases the risk for cardiac mortality in subjects with or without cardiac disease at baseline. The excess cardiac mortality risk was more than twice as high for major depression as for minor depression.

Bokhari et al., (2002) examined the prevalence of depression in patients with CAD in a tertiary care hospital setting in Pakistan. Their sample consisted of 154 patients of CAD (115 males and 39 females) who were randomly selected from the outpatient department and wards of the National Institute of Cardiovascular diseases, Karachi and was scored for depression via the Hospital Anxiety and Depression scale. The results indicated that the point of prevalence of depression in the sample was 37% (31.3% males and 53.8% females). Female, sex, income level below Rs. 5000 / month, low education level, outpatient, single earning family member and hypertension were few variables associated positively with depression. They concluded that depression is prevalent in CAD patients in Pakistan.

Romanelli, Fauerbach, Bush, and Ziegelstein (2002) studied the significance of post-MI depression in individuals aged 65 and older. They concluded that older post-Nil patients with depression have more comorbidities than older patients without depression and have almost four times the risk of dying within the first four months after discharge. Although this increased risk is likely to be related to many factors, the data suggested that sicker patients who are older and depressed may less often
be prescribed medications known to reduce post MI morbidity and may also have greater difficulty following recommendations to reduce cardiac risk than their counterparts without depression. Efforts to improve adherence to post nil treatment guidelines and to enhance patient compliance may improve prognosis in this high risk group.

Fenner and Michels (2003) studied 134 patients with acute myocardial infarction who were treated in an intensive care unit (ICU) of a German hospital were selected for patients with a low social status were found to have elevated mean values of the following scales: somatization (0.93), depression (0.66) and anxiety (0.59). The Global Severity Index (GSI) as a global measure of psychological distress was elevated as well (0.46). They concluded that, since patients with a limited social network and low social status, increased anxiety and depressive, scores have a poor prognosis as to their mortality, and their professional reintegration, it was considered necessary for the prospective setting of this study to register particularly these patients in order to treat their anxiety.

A decrease in heart rate variability may mediate the deleterious effect of depression on post myocardial infarction prognosis. Other factors such as mental stress and altered platelet function may also predispose depressed patients to a heightened risk of cardiac events. With an increased understanding of the relationship between depression and heightened risk of cardiovascular mortality, it is necessary to assess current overall treatment for cardiac patients. Heart disease affects an established 12.2 million American people. While about 1 in 20 American adults experience major depression in a given year, the number goes to about 1 in 4 for people who have survived a heart attack (Regier, Narrow, and Rae, 1993).
Musselman, Evans and Nemeroff (1998) found that major depression and depressive symptoms although commonly encountered in medical populations, are frequently underdiagnosed and under treated in patients with cardiovascular disease (CVD). Studies investigating pathophysiological alternations related to CVD in depressed patients are reviewed. The few studies on treatment of depression in patients with CVD are also described. Treatments of depression in patients with CVD improves their dysphoria and other signs and symptoms of depression, improves quality of life, perhaps, even longevity.

Irvine et al., (1999) in a study on the impact of depressive symptoms and social support on 2-year sudden cardiac death (SCD) risk, controlling for fatigue symptoms, concluded that the symptoms of depression and fatigue overlap in patients with MI. The trend for the cognitive affective symptoms of depression to be associated with SCD risk, even after controlling for dyspnea/ fatigue, suggests that the association between depression and mortality after AMI cannot be entirely examined as a confound of cardiac-related fatigue. The independent contribution of social participation suggests a role of both depressive symptomatology and social factors in influencing mortality risk after MI. Recent evidence suggests that the association between depression and increased cardiac mortality may in part be due to an increase in platelet activity and an imbalance in sympathetic and para sympathetic activity that makes the patient more susceptible to ventricular fibrillation.

Depressed survivors of heart attack have a 3.5 greater risk of death than do non depressed cardiac patients, (Guck et al., 2001), with most of those deaths occurring during the first 6 months after diagnosis (Frasure-Smith, Lesperance, and Talijic, 2000). The relationship between stress and
depression is complex, but depression has a relationship to immune function (Herbert and Cohen, 1996).

**Depression and cancer**

Depression that meets the diagnostic criteria for clinical depression is associated with several measures of immune function with anger effects for older and for hospitalized patients. In addition, the more severe the depression, the greater will be the alternation of immune function. A meta-analysis of depression and immune function indicated that depression was significantly related to many facets of immune system function, including reduced T cells and decreased activity of natural killer cells (Zorrilla et al., 2001). Therefore, not only are stress and depression related to each other, but also the immune system responds to both.

Although this is a controversial issue, there is some evidence to suggest that personality traits such as trait-depression (Persky et al., 1987) or being a ‘loner’ (Shaffer et al., 1987) are associated with cancer. Persky et al., (1987) found that those who scored highly on a depression scale were twice as likely to develop cancer as those who did not. Everson et al., (1996) did find that moderate hopelessness was associated with incidence of cancer.

Williamson et al., (2000) conducted survey data from 95 women with Stage 1 (n = 36), Stage 2 (n = 49), or Stage 3 (n = 10) breast cancer both confirm and extend prior research indicating that restriction of normal activities is an important factor in depressed affect. Illness severity was directly related to more restricted routine activities, and more activity restriction was associated with higher public self-consciousness and less
social support. Beyond the effects of age, self-consciousness, illness severity, and social support, activity restriction explained significant additional variance in symptoms of depression. Moreover, activity restriction mediated the impact of pain, public self-consciousness, and social support on depressed affect, which implies that these factors foster symptoms of depression by disrupting normal activities.

Fletcher et al., (2006) explored the patterns and predictors of psychological distress in first-degree female relatives (N = 624) of newly diagnosed breast cancer patients were explored. First-degree female relatives who were high monitors reported greater cancer-specific and general distress than did low monitors. Greater optimism was associated with lower cancer-specific distress. Optimism's effect on general distress was moderated by women's level of monitoring. Greater optimism was associated with lower general distress for both high and low monitors, but the effect was stronger for high monitors than for low monitors. Avoidance and engaged coping were associated with higher distress. A close relationship with the cancer patient was related to higher cancer-specific distress but lower general distress.

Cancer patients (N = 238) receiving palliative radiation treatment were followed for 8 months, 70 patients had died by the 8-month follow-up. Controlling for site of cancer and level of symptomatology at baseline, Schulz, et al (1996) studied the independent effects on mortality of pessimism, optimism, and depression. The findings show that the endorsement of a pessimistic life orientation is an important risk factor for mortality, but only among younger patients (ages 30-59). Attempts to replicate this finding with conceptually related constructs such as depression or optimism did not yield significant associations for either
younger or older patients, suggesting that negative expectations about the future may contribute to mortality in unique ways. They conclude that attempts to link psychosocial factors to mortality should focus on specific psychological constructs instead of diffuse, global measures that cover many psychological phenomena and that the role of psychological processes in mortality may vary dramatically depending on age.

ANXIETY

Anxiety and cardiovascular disease

Another common psychological reaction to heart attack is anxiety. Patients with high anxiety levels often suffer additional complications, such as angina, heart spasms, another heart attack, or death (Moser and Dracup, 1995).

For many cardiovascular patients, stress and underlying lifestyle patterns are among the well documented risk factors known to contribute to both the development of cardiovascular disease and to recovery. These risk factors include anger, (Kawachi et al., 1996) hostility, (Williams et al., 1992) social isolation, (Blazer et al., 1994) stress, (Frasure-Smith et al., 1996) anxiety, (Kubzansky et al., 1997, Sullivan et al, 2001) and depression (Januzzi et al., 2000).

Januzzi et al., (2000) found that anxiety is prevalent in patients with acute cardiac illness and triples the risk for mortality following a myocardial infarction, doubles the risk for reinfarction over 5 years, and increases the risk for sudden cardiac death by a factor of six. The incidence
of major depression in patients with acute cardiac illness is approximately 25% and that major depression following a myocardial infarction has a devastating effect on both the quality of life and adherence to therapies, and quadruples the risk for mortality.

Pochard, Bellivui, Faersal and Squaia (1997) describe the incidence and the prevalence of anxiety and depression, first in coronary heart disease and secondly before cardiac surgery. Myocardial ischemia can be elicited by mental stress in the laboratory and during daily life and that ischemia induced by mental stress is associated with an increased risk for future cardiac events in patients with CAD.

Philip (2008) examined the association between symptoms of depression, anxiety and mortality risk following coronary artery bypass graft (CAGB) surgery. They assessed 440 CABG surgery patients’ scores on the Depression, Anxiety and Stress scale (DASS) and followed up mortality states for a median of 5 years. There were 67 (15%) deaths overall during the follow up period. Adjusted survival analysis showed that preoperative depressive symptoms were not associated with a significantly higher risk of mortality survival analysis adjusted for covariates showed a significantly increased mortality risk. Pre operative anxiety symptoms were significantly associated with increased mortality risk after adjustment for known mortality risk factors.

Mayou et al., (2000) investigated the significance of emotional distress immediately after a myocardial infarction as a predictor of physical, psychological and social outcomes and resource use. The results showed that 15 % of patients’, use of infarct distress and poor adjustment. There was an improvement at 3 months, but there was little overall or individual
change after time. Anxiety and depression did not predict subsequent mortality but did significantly predict poor outcome at one year on all dimensions of the 36 items short form quality of life measure and on specific measures of everyday activity and reports of chest pain, use of primary care resources, and secondary prevention life style changes. The study concluded that the subjects who are distressed in the hospital are at high risk of adverse psychological and quality of life outcomes during the ensuing year. Their findings strengthen the argument for in-hospital identification and treatment of patients with depression and anxiety after myocardial infarction.

Lane et al., (2001) investigated the impact of symptoms of depression and anxiety on mortality and QOL in 288 patients hospitalized for acute myocardial infarction (MI). The study reported that the symptoms of depression and anxiety did not predict either cardiac or all-cause mortality after MI, but they did predict QOL among those who lived to 12 months.

Lane et al., (2002) assessed the prevalence and persistence of symptoms of depression and anxiety during the first 12 months following acute myocardial infarction (MI) (N= 288). Results showed that during hospitalization, 89 (30.9%) and TS (26.1%) patients registered elevated BDI scores and state anxiety scores (greater than or equal to 40) respectively. The 4 and 12 month prevalence rates were 37.7% and 37.2% of depressive symptoms and 41.8% and 40 % for anxious symptoms respectively. They concluded that the symptoms of depression and anxiety are prevalent, persistent problems during the first year following MI.
Kawachi et al., (1994) assessed thirty four thousand male health professionals who were initially free of cardiovascular disease at base line. The age-adjusted relative risk of fatal CHD was significantly different when the highest and lowest subsets were compared and adjusted for other potentially confounding variables. Interestingly, the excess risk was confined to sudden death. The study did not, however, measure other personality or psychiatric variables such as indices of depression.

Economic conditions may pose an additional threat on cvd patients. The physicians (esp. cardiologists) need to be aware of this co-morbidity so as to be able to diagnose and adequately manage these patients. Jastrehow et al., (2002) indicated that 30 % of cardiac, 39% of orthopedic and 81 % of psychosomatic patients have symptoms of anxiety and/ or depression.

Psychosocial stressors (although not specific to depression) are also associated with significantly increased risk of myocardial infarctions (MI) almost roughly equivalent to the risks associated to the risks associated with smoking and diabetics and higher than risk of obesity (Yusf Hawken and Ounpuu, 2004).

Conversely, in a meta analysis of 25 studies with 106,628 subjects, the relative risk of dying (all causes) in depressed subjects was 1.81 compared with age and sex matched non depressed control subjects with a risk of 1.5 for men and 1.7 for women of dying from CVD (Cuijers and Smit, 2002).

Attempts to explain the nature of the stress/ depression CVD associations have resulted in conflicting results as the impact of such comorbidities goes beyond the disability resulting from the presence of
more than one disease to impairing quality and shortening span of life (Musselman, 1998).

Thombs et al., (2008) studied depressive symptoms in 477 hospitalized patients with recent MI by using the BDI reversed version (BDI-II). The study aimed to confirm a factor model for finding the best fitted model for depressive symptoms in cardiac patients following adjusting for somatic symptoms overlap. Depressive symptoms occurred in 22.4% of post-MI patients in keeping with previous reports of depression prevalence in CVD patients. The study found that somatic symptoms accounted for only 11% of the variance, and the best fitting model included the general depression, somatic and cognitive factors model. Although, the BDI is not diagnostic of depression and contains several somatic factors, this study demonstrated a new approach to using the BDI to identify depressive symptoms in cardiac patients despite the presence of somatic concerns.

Anxiety and cancer

Dougherty et al., (1986) examined the level of and the change over time in denial, death anxiety, anxiety, depression, hostility, love, being, and self-esteem in terminal cancer patients. Sample size was 30 cancer patients (aged 51-74 yrs), 27 arthritic patients (aged 52-75 yrs) who constituted a chronically ill, but not terminal, control group, and 30 healthy control Ss (aged 51-76 yrs). The cancer patients had significantly lower death anxiety than the control Ss, and a relative increase in the Being variable over time. There was little evidence of appreciable denial of serious illness in the cancer patients and an inverse relation between death anxiety and denial,
which lends some support to clinical opinions that denial protects against death anxiety.

Andrykowski (1994) found an attitude towards cancer characterized by ‘anxious pre-occupation’ and a poorer functional quality of life was each independently associated with poorer post bone narrow transplant survival.

Lageman et al., (2006) longitudinally investigated cognitive changes related to stage I-III a standard breast cancer treatment and included pre-treatment assessment of patients. Patients completed assessments over the course of 1 year. Baseline assessments were conducted after surgical interventions but before adjuvant treatments but before adjuvant treatments began, one month after chemotherapy (CT) 7 radiation therapy (RT), and 6 twelve months after endocrine therapy (ET) commenced 2 women with early stage breast cancer were administrated a comprehensive neuropsychological battery, measures of mood, anxiety and QOL including energy level. Three treatment groups were analysed. Patients did not differ with regard to age, educational level, and estimated verbal intelligence, but were found to statistically differ in terms of stage of their breast cancer, and RT use, which were included as covariates in the analysis. In general, depression and anxiety decreased and QOL increased overtime as women progressed through treatments. However, CT patients reported higher depression and trait anxiety levels and poorer QOL, including increased fatigue, compared to the other patient groups. Notably, changes in cognition over the course of one year were not detected in this sample. Furthermore, type of treatments breast cancer patients received did not influence performance on the psychological measures used. Importantly, RT, age, education, stage of breast cancer, and self reported emotional functioning were included as covariates to ensure that variability in these
factors among the patients studied was accounted for in the analysis conducted. Educational level obtained was found to vary the pattern of practice effects demonstrated in this patient sample. In general, the higher the education patients had completed the more they benefited from repeated exposure to neuropsychological tests.

**STRESS**

The modern age is ‘the age of stress’ and stress related diseases, which pose a serious challenge to not only medical professionals but to the whole concerned diaspora. In spite of the leaps and bounds in medical sciences, we are surrounded by a very silent but dangerous foe, lifestyle diseases.

Stress is defined as ‘the non-specific response of the body to any factor which threatens the body’s abilities to maintain homeostasis. The term 'stress' in this context was coined by Austro-Canadian Endocrinologist Hans Selye, who defined the General Adaptation Syndrome or GAS paradigm in 1936.

Stress is a process of appraising events (as harmful, threatening, or challenging), of assessing potential responses, and of responding to those events, responses may include physiological, emotional, cognitive and behavioural changes.
**General Adaptation Syndrome**

**Fig 27**

**General Adaptation Syndrome model**

**Alarm: The 1st stage.** When the stressor is identified, the body's stress response is a state of alarm. Adrenaline is produced to bring about the fight or flight response. Also some activation of the HPA axis produces cortisol.

**Resistance: The 2nd stage.** If the stressor persists, the body begins to try to adapt to the strains of the environment and cannot keep this up indefinitely, so its resources are gradually depleted.

**Exhaustion: The 3rd stage.** All the body's resources are eventually depleted and the body is unable to maintain normal function. At this point the initial symptoms may reappear (sweating, raised heart rate etc.). If extended, long term damage results as the capacity of glands and the immune system is exhausted resulting in decompensation manifesting into illnesses e.g. ulcers, depression, cardio-vascular problems, and mental illnesses (Selye, 1975).
Stress and illness

A relationship between antecedent psychosocial stress and illness has been recognized for centuries (Cooper and Payne, 1991). As far back as the history of recorded medicine, Galen and Hippocrates documented role of temperament in illness. The stress – illness relationship can be very complex, since it is influenced by a number of pre-existing and intervening factors.

Models of the relationship between stress and illness

The direct route model emphasis that stress can produce physiological and psychological changes conducive to the development of illness, precursors (forewarnings) of illness such as fatigue and achiness then develop which, if untreated, can lead to illness. However, not everyone exposed to the same source of stress will develop an illness. This is because individual or environmental factors can intervene to disrupt the path between stress and illness. Some people may take action against the stressors early on, before any psychological and physiological damage is done. The interactive route model emphasizes the importance of preexisting psychological or physiological vulnerabilities in the stress-illness relationship, suggesting that stress leads to illness only among people who have an initial vulnerability, stress alone or vulnerability alone is not sufficient to produce illness. The health behaviour route model maintains that stress can indirectly affect illness by altering a person’s behaviour patterns- the health behaviour route. To the extent, that health habits are altered by stress, then, illness may be a consequence. The Illness behaviour route model maintains that stress can affect illness behaviour directly without causing illness. Research evidence indicated that people
under stress are more likely to use health services than people who are not under stress. Illness behaviour brings secondary gains in the form of attention, sympathy, and freedom from unwanted responsibilities and thus may itself be a way of coping with illness (Cohen et al., 1995).

Stress may affect health by altering the immune system of organisms and disease susceptibility. Stress influences immunity through direct innervation of the CNS through hormonal pathways which lead to increased production of Catecholamine by the adrenal cortex or through behavioural changes which occur as adaptations or coping responses in the face of stress or negative emotional states. A person experiencing stress may often emerge in poor health practices such as smoking, poor sleeping and poor hierarchy practices which may make the individuals more vulnerable to diseases (Cohen and Hebert, 1996). Many earlier studies have also reported Life Event Stress to be related to disease (Baum et al., 1985).

The stress-related disorders which have received most attention in the scientific literature includes gastrointestinal disorders (including stomach and duodenal ulcers, ulcerative colitis and irritable bowel syndrome), cardiovascular disorders, respiratory diseases (including allergies, bronchial asthma and hyperventilation), musculoskeletal disorders and skin disorders. Other disorders which have been linked to stress include diabetics, stroke, migraine, indigestion, heart burn, headaches, cancers and rheumatoid arthritis (Gregson and Looker, 1994).

Doctors and researchers estimate that 50 - 80% of patients seem in general medical practice have stress related problems (Ursin, 1997). The relationship between stress and disease risk has been more difficult to establish than have similar stress effects on immune function. Not all
biological manifestations of stress will necessarily translate into clinically observable effects.

According to Baum et al., (1985) stress by itself does not lead to an illness unless the individual has difficulties in dealing with the situation. Sarafino (1994) postulated that stress of contemporary life could impair immunologic functioning and increase susceptibility to disease.

Many recent studies in India, have established the relationship between chronic disease severity and psychosocial stress (Mohan et al., 2000).

In a study subjects with an external locus of control perceived situations as uncontrollable, which led to increased level of stress that are associated with significantly more psychosomatic symptoms (they developed more physical illness). In comparison, subjects with an internal locus of control appraised situations as less stressful and developed fewer psychosomatic symptoms (Stern et al., 1982).

**Stress and cardiovascular diseases**

Psychological stress or tension is now recognized as the most important risk factor of coronary heart disease. Emotional stress comes in two basic categories: acute and chronic. The body responds to stress-whether emotional stress (perceived danger) or physical stress (extreme temperature changes or exertion) by activating a series of mechanisms collectively known as the fight-or-fight response, which prepare us either to fight or to run (Chhajer, 1997).
Stressful situation can affect cardiovascular functioning is well known. From the time of Cannon, a vast literature has accumulated on the impact of stressful stimuli ranging from direct stimulation of various areas of the brain to the effects of a variety of classical conditioning procedures (Sharpio, 1978). Therefore, CAD patients were compared on both acute stress (Life Events Stress) and chronic stress (Daily Hassles) with Healthy Control. As expected CAD patients scored higher than Healthy Controls on both measures of stress. Differences were more pronounced in case of chronic stress. It may be so because chronic strains are persistent condition that require daily adjustments and repeatedly interfere with the adequate performance of daily activities (Cohen and Herbert, 1996). The pathogenesis of CHD is complex, involving various biochemical, inflammatory and hemodynamic processes (Black and Garbutt, 2002, Ross, 1999).

Bio-behavioural mechanisms in the etiology or course of CHD may intersect with CHD pathophysiology at multiple levels. Nervous and endocrine systems interface with the heart, causing changes that are ostensibly adaptive in the short term when faced with acute stress. However, increases in the frequency of exposure to glucocorticoids or catecholamines or other stress related changes can precipitate a number of hemodynamic and immune / inflammatory changes that can be pathogenic over along run. Stress-related hemodynamic change may contribute to CHD processes by influencing heart rate, cardiac output, blood pressure, and clotting processes including coronary vasoconstriction and platelet aggregation (Smile and Ruiz, 2002).
Evidence for the role of stress as a precipitating factor for heart attack or stroke in people with CVD is clear. Gullette et al., (1997) found that stress can serve as a trigger for heart attacks. This study looked at negative emotions of outpatients with CHD during the hour immediately preceding a heart attack and discovered that feelings of sadness, frustration, or tension can more than double the risk for heart attack. Stress increases the chances of chest pain as well as heart attacks in people with existing CVD (Krans, Sheps, Carney and Natelson, 2000).

Some other studies also reported stress to induce increase in HR and BP (Mills and Dimsdale, 1991). Studies have also reported that stress reduction interventions increase immunity of the individual (Glaser et al., 1986., McGrady et al., 1992).

Stress-related SNS or HPA activity may also contribute by mediating immune and inflammatory processes, and growing evidence suggests that these processes are centrally involved in CHD. For eg. Products of HPA and SNS activity such as corticosteroids and cytokines can mediate inflammatory processes at sites of endothelial damage, promoting the adhesion of immune cells to the arterial wall (Black and Garbutt, 2002). This, then, contributes to narrowing of the interior of the vessel.

Stress may lead to hypertension through repeated blood pressure elevations and by increasing the amount of vasoconstricting hormones. Stress factors like job strain, social environment, and emotional stress can contribute to hypertension. Although stress does not directly cause hypertension, it can clearly affect its development. Stress leads to adrenergic activation with excessive amount of epinephrine and other
hormone like cortisol and adrenocortical hormones. Measures to reduce stress like meditation, acupuncture, bio-feedback and music therapy have been found to be effective in decreasing blood pressure and the development of hypertension (Voügal et al., 2005).

Kristina Orth-Gomer et al., (2005) proposed that double exposure to stressors at work and from family are associated with increased coronary risk in women and that the same exposures are accompanied by depressive feelings. The study group comprised 292 women coronary patients (30–65 years) and 292 age-matched healthy controls. Work-stress, marital-stress, and depressive symptoms were assessed by standardized questionnaires and evaluated in both case-control and 5-year follow-up analyses. It is found that double exposure to stress from work and family was accompanied by the highest risk and the worst prognosis in women's coronary disease. In women patients depressive feelings were frequent, and they were more closely related to family than to work stress. In healthy women, both stressors, but in particular their combination, lead to depressive symptoms.

Once the interior lining of the blood vessel has been damaged, the resulting lesions may constitute vulnerabilities for subsequent buildup of a atherosclerotic plaque at these sites. In addition to causing hemodynamic changes that can damage arteries and coronary vessels, stress-related endocrine effects may be pathogenic by promoting the formation of blood clots or altering neural transmissions to the heart (Kamarck and Jennings, 1991).

O’connor, Gurbel and Serebruancy (2000) observe that persons who have mental stress during daily life are at twice the risk of CHD, and patients with post myocardial infarction depression have higher mortality
rates than non depressed controls. These data suggest that a psychophysiologic mechanism underlying the vulnerability of depressed patients to CHD. Clinical studies have demonstrated that depression is associated with a higher risk of both cardiovascular morbidity and mortality, which could be caused by platelet activation. Physicians should maintain a heightened level of clinical suspicion for depression and depressive disorders in patients with CHD, particularly those individuals who are recovering from an acute myocardial infarction. Furthermore, depression may complicate the recovery of CHD, but in most cases depression can be effectively treated with antidepressant agent.

Blumenthal et al., (1997) examined the extent to which ischemia induced by mental stress can be modified by exercise stress management. Their results reported that 23 patients (21%) experienced at least one cardiac event during a follow-up period of 21-35 months. Stress management was associated with a relative risk of 0.26 compared with controls. The relative risk for the exercise group also is lower than that of controls, but the effect did not reach statistical significance. Their results suggested that behavioral interventions offer additional benefit over and above usual medical care in cardiac patients with evidence of myocardial ischemia.

Dedkhard, Saowapa (2006) was to examine risk factors of cardiovascular disease in rural Thai women. Non modifiable risk factors (physiological, behavioral and psychological factors), contextual risk factors, as well as coping were conceptualized as major variables. The sample consisted of 149 rural Thai women who had been diagnosed with CVD and resided in rural northern Thailand. The results revealed that age, hypertension, cigarette smoking, stress, depression and poverty had positive relationships with the severity of CVD. BMI, physical activity, education
level and family income was inversely related to the severity of CHD. However, total cholesterol, diabetes mellitus, menopause status, alcohol consumption, distance to the hospital, transportation to health care, and coping had no relationship to the severity of CVD. A few of the physiological and behavioural risk factors such as blood pressure, cigarette smoking and physical inactivity were significantly predictors of the severity of CVD in rural Thai women. Psychological stress and the contextual risk factors of income and poverty were also significant predictors of the severity of CVD in these women. Moreover, there are significant moderator effects in predicting to the severity of CVD, total serum cholesterol and family income, diabetics and distance to a hospital, BMI and transportation, menopause and income, cigarette smoking and transportation and depression and poverty. The findings suggested that few of the traditional risk factors of CVD were significant risk factors for CVD. Noteworthy findings demonstrated that psychological stress and contextual risk factors played an important role in contributing to CVD in rural Thai women.

Wong et al., (2005) examined the characteristics of emotion regulation behaviours during an acute stress episode and investigated the impact that emotion regulation strategies had on affective, cardiovascular and neuroendocrine responses. Participants were 55 female breast cancer survivors aged 36-80 who completed their completed their breast cancer treatment at least months, but not more than 2 years, prior to their participation in this study. After accounting for effects associated with appraisal of stress situation, negative mood, recent experiences of stress and other individual differences factors, the use of attention deployment, significantly increased negative affect and neuroendocrine responses over the course of the stress inducing task. The use of humour significantly decreased negative affect, and neuroendocrine responses. In contrast, the
use of cognitive reappraisal, emotion suppression, and seeking social support did not significantly impact these response systems. Contextual factors might have generated competing emotional goals that led to present results regarding the relative efficacy of specific regulation strategies used. Overall, this research confirmed the necessity and utility of studying emotion regulation as a complex and dynamic process that occurs in “real-time”.

**Stress and cancer**

A substantial body of research suggests, links between stress, coping and cancer (Levy, 1983). There is considerable support for the likelihood that stress increases risk of respiratory infections such as colds (Cohen et al., 1996., Cohen, Tryrell and Smith, 1991) and some research supporting the possibility that stress or other psychological factors increase the risk or progression of cancer or other illnesses (Cole, Kemeny, Taylor and Visscher, 1996., Ramirez et al., 1989).

Although the immune system is considered a likely mediator of these observed relationships, verification of immune mediation of stress-related health effects has been elusive (Cohen et al., 1998) and clinical relevance of stress-related immune changes has not been empirically established for any diseases.

Researchers are still attempting to confirm the possibility that stress-related immune changes affect the incidence or progression of cold and influences (Cohen et al., 1991), HIV disease (Leserman et al., 1997) and cancer (Andersen, Kiecol-Glaser and Gaser, 1994). In addition, asthma,
arthritis, irritable bowel syndrome and psoriasis may be influenced through similar psycho immune mechanisms.

Sopie Label et al., (2008) used data collected at 3, 7, 11 and 15 months post-diagnostic to predict stress related problems in 86 breast cancer patient survivors at 6 years post-diagnosis. They examined two common stress-related problems: (a) emotional distress and (b) intrusion and avoidance. Hypothesized risk factors included perceived stressfulness of the cancer, fear of the future: poor perceived health: initial stress-related problems: avoidance coping, and second cancer experience. Hypothesized protective factors included active coping (seeking social support, positive problem solving), optimism, and social support. Hierarchical multiple regression analyses, controlling for age and education indicated that positive problem-solving coping at 3 months and emotional distress at 7 months significantly predicted 6 year emotional distress. Second cancer experience and 3 month intrusion and avoidance significantly predicted 6 year intrusion and avoidance. In both case, risk and/ or protective factors measured at 11 and 15 months did not add significantly to the regression equations. Symptoms of intrusion and avoidance should be monitored carefully during the first 3 months following a diagnosis because they signal the risk that these symptoms will persist in the long term. Elevated emotional distress at 7 months post diagnosis and second cancer experiences may signal the need for psychosocial intervention. Over reliance on positive problem solving to cope early in the disease trajectory may be detrimental in the longer term.

Quinlan et al., (2006) utilized a mixed method approach examine adjustment with 7 female and 5 male survivors of cancer who were diagnosed during adolescence. Thematic analysis revealed that adjustment
is the process of changing one’s perceptive or redefining oneself as one works to determine a role for cancer in one’s life. The study found that concerns about uncertainty and physical functioning, along with the developmental challenges, served as the key stressors facing survivors. The presence or absence of social support, individual characteristics (ie. Optimism, coping), positive relationships with medical system, economic resources, and concurrent stressors were some of the most salient factors for survivors when thinking about adjustment. Additionally, psychosocial interventions could interact with any of the mediating variables to ameliorate the stressors associated with the cancer experience. Developmental differences in the experience of cancer also emerged, with those diagnosed during late adolescence being more likely to report, challenges with intimate relationships, infertility, and college/graduation, while survivors diagnosed at a younger age were more likely to report accessibility of the school environment, conflict with parents, and difficulties developing a sense of social and psychological self as a additional sources of stress. Gender differences in the experiences of cancer also emerged, with women reporting additional challenges and different coping strategies. Quantitatively, those diagnosed at a younger age and males scored higher on purpose in life measures and measures of psychosocial functioning.

Buonocore and Susan, (2005) investigate the relationship between breast cancer in women and post traumatic stress disorder (PTSD) symptomatology. Particular emphasis was placed on the specific factors that can predict the development of PTSD in this population. Results indicate that participants experience more PTSD symptoms related to their cancer diagnosis than to their treatment for cancer. In addition, women diagnosed at a later stage (stages III and IV) were more likely to have
PTSD, as measured by PDS than women diagnosed at an earlier stage (stages 0 through II). When factors such as demographics, social support, and coping skills were controlled for, the regression analysis indicated the following results. Those women who were diagnosed with PTSD were more likely to use denial or religion to cope, their cancer had been caught at an earlier stage, and more time had passed since the cancer diagnosis. The more the women used humor to cope, the less likely to have PTSD. Trauma history did not affect the outcome. The findings suggest that a combination of factors can make women vulnerable to PTSD in response to a diagnosis of breast cancer.

The relationship of dispositional optimism, daily life stress, and domestic environment to two types of coping methods was examined in a group of 94 cancer patients. As expected, dispositional optimism and domestic environment made significant contributions to the prediction of avoidance coping. Dispositional optimism contributed significantly to the prediction of active-behavioural coping. Specifically, a significant positive relationship was obtained between active-behavioural coping and optimism. A significant positive relationship also was found between avoidance coping and both daily stress and domestic environment. Avoidance coping was negatively related to dispositional optimism. In multivariate analyses, gender and disease-related variables did not make significant contributions to the prediction of coping method (Lois Friedman, 1991).

Michael et al., (2009) examined associations among life events, stress, social support, and breast cancer incidence in a cohort of postmenopausal women. (n = 84,334). During an average of 7.6 years of follow-up, 2,481 invasive breast cancers were diagnosed. Stressful life events and social support appeared to interact in relation to breast cancer
risk such that women who had greater number of stressful life events and low social support had a decreased risk of breast cancer. This study found no independent association between stressful life events and breast cancer risk.

Studies that have intervened to reduce stress among cancer patients have found a variety of benefits associated with stress reduction, including some evidence of slowed disease course (Baum and Anderson, 2001., Fawzy et al., 1993., Spiegel, Bloom, Reamer and Gottheil, 1989).

Forsen (1991) found that women who knew that they had breast cancer reported higher levels of chronic stress prior to its onset than those in a matched control group without cancer. Women who reported high levels of stressful life events prior to surgery for breast cancer were three and half times more likely to die of cancer in the years following surgery than their less stressed counterparts.

Spiegal and Kato (1996) conclude that there probably is an association between stress and cancer, but that the methodologies used to explore this relationship have proven weak and have contributed noise rather than coherence to our understanding of this relationship.

Individuals who cope with stress by being acquiescent and pleasant and repressing negative emotions may be more likely to develop malignancies (Lampic et al., 1994).

There is no definitive evidence that stress influences the course of cancer or survival rates. For example, no relationship was found between stressful events and breast cancer survival (Barraclough et al., 1992).
However, bereavement (losing a son in a war or in a traffic accident) increased the risk of death from different types of cancer, but only if the cancer had been diagnosed before the loss (and not after it) (Levav et al., 2000).

**PSYCHOLOGICAL DISTRESS**

Researchers have stated that unhappiness and worry during certain periods of the illness can’t be avoided altogether, indeed for many patients a limited period of emotional distress is probably a prerequisite this has been described as ‘essential distress’ (Kelly et al., 2002).

Emotional distress has been reported in disabled patients receiving help from their spouse. Fatalistic attitudes, perceived control, and lower self-esteem predicted greater “helping distress” (as in negative assistance related stress) whereas lower self-esteem, fatalistic beliefs, and marital conflicts were especially likely to lead to helping distress for those who received higher levels of assistance (Newsom and Schulz, 1998).

**Psychological distress and cardiovascular diseases**

Ivonne Lesman-Leegte (2006) found that the greatest proportion of psychological distress (10%) was estimated among participants with self-reported chronic heart failure (CHF). They state that perhaps most alarming is the very low number of patients who saw a mental health professional within the past year, which was only 35%, even in those heart failure (HF) patients with psychological distress. They completed baseline data of 1050 elderly hospitalized patients with a confirmed diagnosis of HF. Mean age of the sample was 72 years and 40% was female. Almost 40% of the
participants reported depressive symptoms. Not more than 8% of these 388 HF patients with depressive symptoms had anti-depressive medication described at discharge from the hospital.

Rasul (2006) examined the association between psychological distress and coronary heart disease (CHD) using an epidemiological community study with hospital admissions data and to examine if any association is explained by existing illness. The Participants were 6575 men and women aged 45–64 years from Paisley. Five year CHD risk in distressed men compared with non-distressed men was 1.78 in age adjusted analysis, 1.78 with socio-demographic and CHD risk factor adjustment, and 1.61 with additional adjustment for existing illness. Psychological distress was unrelated to five year CHD risk in women. In further analysis, compared with healthy, non-distressed men, distressed physically ill men had a greater risk of CHD than non-distressed physically ill men, a relative risk of 4.01 compared with 2.12. The association of psychological distress with an increased risk of five year CHD risk in men could be a function of baseline physical illness but an effect independent of physical illness cannot be ruled out.

Mark Hamer (2008) in a prospective study of 6,576 healthy men and women (ages 50.9 ± 13.1 years), measured psychological distress and behavioural (smoking, alcohol, physical activity) and pathophysiological (C-reactive protein, fibrinogen, total and high-density lipoprotein cholesterol, obesity, hypertension) risk factors at baseline. The main outcome was CVD events (hospitalization for nonfatal myocardial infarction, coronary artery bypass, angioplasty, stroke, heart failure, and CVD-related mortality). Cigarette smoking, physical activity, alcohol intake, C-reactive protein, and hypertension were independently associated with
psychological distress. There were 223 incident CVD events (63 fatal) over an average follow-up of 7.2 years. The risk of CVD increased in relation to presence of psychological distress in age- and sex-adjusted models. In models that were adjusted for potential mediators, behavioural factors explained the largest proportion of variance (≈ 65%), whereas pathophysiological factors accounted for a modest amount (C-reactive protein ≈5.5%, hypertension, ≈13%). The association between psychological distress and CVD risk is largely explained by behavioural processes.

**Psychological distress and cancer**

Demographic and medical factors have also been associated with risk of developing psychosocial problems following a diagnosis of cancer. For example, studies have found significantly higher depression, anxiety and general distress in younger patients than in older patients (Mor, Allen, and Malin, 1994., Van’t Spijker et al., 1997).

Politi et al., (2007) examined the impact of age and emotional acceptance on distress among breast cancer patients during 18 months after the diagnosis. The samples were 79 women with stage II or stage III cancer, the study was a part of a larger study on social support among breast cancer survivors, thus women in the study has atleast one child over the age of 10. In this sample, younger women reported more distress than older women. Those who were less accepting of their emotions also reported greater distress than those who were more accepting. However, emotional acceptance did not moderate the relationship between age and distress. These results suggest that emotional acceptance can be a beneficial coping strategy for both younger and older women with breast cancer.
Park et al., (2006) conducted cross sectional descriptive study were to examine the association of objective and subjective breast cancer risk with immune relationship, mediating role of psychological distress in the subjective risk with immune relationship, the moderating role of dispositional optimism in the subjective risk- psychological distress relationship, the relationship between objective and subjective breast cancer risk in a community sample of healthy women at varying levels breast cancer risk. A convenience sample of 117 healthy women completed questionnaires for objective and subjective breast cancer risk assessment psychological distress, and dispositional optimism and gave a blood sample for measurements of NKCA. Higher objective risk was associated with lower NKCA at 12-5:1 effectors-to-target ratio after controlling for birth control use and subjective risk, whereas subjective risk showed no effect on NKCA. Psychological distress didn’t mediate the effect of subjective risk on NKCA, although high subjective risk was associated with high psychological distress. Dispositional optimism moderated the relationship of subjective risk with general psychological distress, but not with breast cancer-specific distress. In addition, objective breast cancer risk showed a moderate but significant positive correlation with subjective risk. These finding suggest that each type of breast cancer risk has unique contribution to psycho-immune profiles in healthy women.

Costanzo et al., (2009) examined whether cancer survivors showed impairment, resilience, or growth responses relative to a socio-demographically matched sample in four domains: mental health and mood, psychological well-being, social well-being, and spirituality. The impact of aging on psychosocial adjustment (n=398) was also investigated. Findings indicated that cancer survivors demonstrated impairment relative to the comparison group in mental health, mood, and some aspects of
psychological well-being. Mental health declined after a cancer diagnosis, poorer functioning in other domains existed prior to diagnosis. However, survivors exhibited resilient social well-being, spirituality, and personal growth. Moreover, age appeared to confer resiliency, older survivors were more likely than younger adults to show psychosocial functioning equivalent to their peers. While younger survivors may be at risk for disturbances in mental health and mood, cancer survivors show resilience in other important domains of psychosocial adjustment.

Jim et al., (2005) found that impaired physical and social functioning following cancer appears to be related to greater distress in part through a decreased sense of meaning in life. Moreover, the mediation models were significant regardless of disease and survivor characteristics (eg: disease site, time since diagnosis, cancer recurrence, age, years of education and gender).

Annette et al., (2000) tested the hypothesis that coping through emotional approach, which involves actively processing and expressing emotions, enhances adjustment and health status for breast cancer patients. Patients (n = 92) completed measures within 20 weeks following medical treatment and 3 months later. Women who, at study entry, coped through expressing emotions surrounding cancer had fewer medical appointments for cancer-related morbidities, enhanced physical health and vigor, and decreased distress during the next 3 months compared with those low in emotional expression, with age, other coping strategy scores, and initial levels on dependent variables (except medical visits) controlled statistically. Expressive coping also was related to improved quality of life for those who perceived their social contexts as highly receptive. Coping through emotional processing was related to one index of greater distress over time.
Analyses including dispositional hope suggested that expressive coping may serve as a successful vehicle for goal pursuit.

Rothman (2006) examined the interaction of perceived risk and distress in predicting health behaviour in first degree female relatives (FDFRs) of breast cancer patients. This relationship was expected to be mediated by coping style. Perceived risk was measured with a 1 item numeric scale, generalized distress was measured using a Brief profile of Mood Scale (POMS), cancer specific distress was measured using the Impact of Events (IES) Intrusion subscale, and coping styles included measures of avoidant and engaged coping adopted from the Brief COPE. Outcomes included mammography, breast self-examination, fruit, vegetable, and dietary fat intake, alcohol consumption, and physical activity. 587 participants completed self report questionnaires approximately 10 weeks, 6 months and 12 months following the diagnosis of their relatives. Results suggested that the effects of perceived health behaviour change are not modified by distress and coping style is not a significant mediator of the relationship between the independent and dependent variables. Age emerged as a predictor of mammography and BSE. Variation in age and relationship between participants and index patients may have limited the probability of detecting association, as association between the main predictors and outcomes were strengthened when the sample were limited to women older than 50 years and mothers of patients were eliminated.

Bovbjerg and Valdimarsdottir (1993) examined the relationship between reported levels of distress and natural cytotoxic activity in breast cancer patients. Patients who reported low levels of distress exhibited lower cytotoxic activity compared to those who revealed high distress. Considering the nature of their illness, it is highly probable that the low-
distress breast cancer patients were demonstrating characteristics of a repressive style by inhibiting the expression of negative emotion.

Majority of the research has been cross sectional, however, a few prospective studies suggesting a role of social support in negating psychological distress are also available (Henderson et al., 1988).

Sivesind and Baile (2001) pointed out that patients may experience psychological distress at diagnosis, during treatment, or over a long period of time as they adjust to life changes.

Estimates of the prevalence of psychological distress among patients with cancer have been somewhat varied, primarily as a result of inconsistencies in operational definitions. On the whole, however, the most consistently found prevalence rates for psychological distress among cancer patients have been in the range of 25 to 30% (Derogatis et al, 1979., Stefanek, Derogatis and Shaw, 1987., Zabora et al., 2001).

Other demographic factors that have been associated with distress in cancer patients include socioeconomic status, race and ethnicity, and a history of substance abuse. There are also a number of medical factors found to be associated with psychosocial distress. With respect to tumour site, breast cancer patients often display lower levels of distress while those with lung cancer display higher levels of distress of distress when compared to patients with other forms of cancer (Van’t Spijker et al, 1999., Zabora et al., 2001).
Specific treatments regiment may also be associated with poor psychological adaptation. For example, patients receiving treatment for head and neck cancer often experience extreme pain, disfigurement which can produce high levels of physical and emotional distress (De Boer et al., 1999).

**SOCIO - DEMOGRAPHIC RISK FACTORS OF CARDIOVASCULAR DISEASE AND CANCER**

Genetic and environmental factors, including diet and life-style, both contribute to cardiovascular disease, cancers, and other major causes of mortality, but various lines of evidence indicate that environmental factors are most important. Overly enthusiastic expectations regarding the benefits of genetic research for disease prevention have the potential to distort research priorities and spending for health. However, integration of new genetic information into epidemiologic studies can help clarify causal relations between both life-style and genetic factors and risks of disease. Thus, a balanced approach should provide the best data to make informed choices about the most effective means to prevent disease (Walter Willett, 2002).

**Socio-demographic risk factors of cardiovascular disease**

Cardiovascular disease esp. coronary heart disease, are major cause of morbidity in India. India not only has the largest number of cases of these diseases, but the disease also occur atleast ten years earlier as compared to the developed countries. Studies have shown that well known major coronary risk factors such as smoking, hypertension, dyslipidemia and diabetics are as important in Indian subjects as elsewhere. Lifestyle
changes are crucial in prevention of coronary heart disease and can lead to amelioration of most of the cvd risk factors. Prevention of the disease in young individuals delays the onset in middle-aged subjects and decreases mortality. Important issues in lifestyle changes are absolute tobacco cessation, adoption of physically active life style, and use of yoga practices. Dietary interventions include restriction of calories to avoid weight gain, restriction of saturated fats, trans fats, n-6 fats, cholesterol and salt, and increased intake of monounsaturated fats, n-3 fats, fruits and vegetables. These changes can be achieved using a combination of population based education and intervention approaches, high risk population based preventive approach and a high risk clinic based treatment approach (Cardiology today, 2007).

Smith and Ruiz (2002) identified a number of psychosocial factors that relate to heart disease Included among these factors are anxiety, depression, education, income, marital status, social support, cynical hostility and anger. Everson and colleagues (1998) found that people with five or more depressive symptoms had a higher level of death from stroke than non-depressed participants.

Ahluwalia et al., (2004) have shown that psychosocial factors have an impact in the incidence of cardiovascular diseases. In a number of cases, following psychosocial factors have been observed.

- Mental stress or a pattern of aggressive behaviour may cause coronary heart disease.
- Anger or grief may cause mental stress, which triggers angina, heart attack or sudden cardiac death.
- Psychosocial fear due to earthquake may lead to cardiac deaths. Similarly, cardiac deaths were recorded among the Israeli civilian population during the first 10 days of Gulf War in 1991.
- Stress-related sudden death has been found to occur in individuals with severe heart disease.
- Mental stress is known to induce ischemia of the heart muscle in a number of cases.
- A single severe stress may cause irregular heart beat called arrhythmia or a disturbance of the heart’s electrical stability, which can cause sudden death.

**Socio-demographic risk factors of cancer**

Wide variability exists with respect to how breast cancer survivors respond to common psychological and psychosocial challenges of their disease, ranging from posttraumatic stress disorder to posttraumatic growth. This cross-sectional study examined contextual, disease-related, and intra-individual predictors of posttraumatic growth in 224 randomly selected breast cancer survivors. A series of hierarchical regression analyses found that age at diagnosis, marital status, employment, education, perceived intensity of disease, and active coping accounted for 34%, 35%, and 28% of the variance in growth in relationship with others, new possibilities, and appreciation for life. These findings suggest that a more comprehensive model of growth will be helpful in understanding the various factors that play a role in breast cancer survivors' perception of psychological and psychosocial growth (Bellizzi et al, 2006).
Epping-Jordan et al., (1994) examined psychological symptoms, avoidance, and intrusive thoughts prospectively as predictors of cancer progression over a period of 1 year. Sixty-six male and female cancer patients who differed in their diagnoses and initial disease-severity ratings participated. Measures of psychological factors, disease severity, and type of treatment were obtained near time of diagnosis and disease status (no cancer, continued or recurrent cancer, or deceased) 1 year later. Cross-sectional analyses near the time of diagnosis showed that initial psychological variables were inter-correlated with one another but unrelated to initial disease prognosis. Longitudinal findings revealed that, after controlling for initial disease parameters and age, avoidance predicted disease status 1 year later, however, neither psychological symptoms nor intrusive thoughts and emotions accounted for additional variance in disease outcomes.

Gerend et al., (2004) examined the relationships of epidemiological (objective) risk indices, perceived disease characteristics, and cognitive heuristics to women's perceived susceptibility to breast cancer, heart disease, and osteoporosis in a community sample of 312 women ages 40-86. Epidemiological indices accounted for a small to moderate proportion of the variance in perceived susceptibility. Psychological factors (perceived similarity to women who contract the target disease and perceived disease prevalence) predicted perceived susceptibility above and beyond medical risk factors. Opposite to actual risk, age correlated negatively with perceived susceptibility to all 3 diseases. Exploratory analyses suggested that perceived similarity, perceived prevalence, and absent/exempt beliefs might mediate this relationship. Confirmatory factor analyses verified that measures of absolute and direct comparative risk assess the same underlying construct of perceived susceptibility.
SOCIOECONOMIC STATUS

A number of studies have shown that low socioeconomic status is associated with a high frequency of stressful events and lack of adequate methods for coping with them (Eron and Peterson, 1982). Thus, it is not necessarily socioeconomic status by itself that causes problems, but rather the life events and poor coping skills that are correlated with the status.

Matthews et al., (2008) tested the reserve capacity model in relation to the metabolic syndrome. There were 401 initially healthy women who followed longitudinally for 12 years. Self-reported characteristics, stressors, and cardiovascular risk factors were measured repeatedly. The study verified reserve capacity as the aggregate of optimism, self-esteem, and social support, and negative emotion as the aggregate of depressive symptoms, anger, and tension. Structural equation modeling showed two pathways to the metabolic syndrome factor, direct from low SES to the metabolic syndrome factor and indirect, from low SES to low reserve capacity to high negative emotions to the metabolic syndrome factor. Low SES may increase risk for metabolic syndrome, in part, through reserve capacity and negative emotions.

Socioeconomic status and cardiovascular disease

Singh (2006) conducted total community cross sectional survey of 20 randomly selected streets in the city of Moradabad to determine the association of social class with prevalence of coronary risk factors and coronary artery disease (CAD). The sample was 1806 urban (904 men and 902 women) randomly selected subjects aged 25–64 years. All subjects
were divided into social classes 1–5 based on attributes of education, occupation, per capita income, housing condition and consumer durables and other family assets. Social classes 1, 2 and 3 were mainly high and middle socioeconomic groups and 3 and 4 low income groups. The prevalence of CAD and coronary risk factors hypercholesterolemia, hypertension, diabetes mellitus and sedentary lifestyle were significantly higher among social classes 1, 2 and 3 in both sexes compared to lower social classes. Mean serum cholesterol, triglycerides, low density lipoprotein cholesterol and blood pressure were significantly associated with higher and middle social classes. Smoking was significantly associated with lower social classes. The study revealed that social class was positively associated with CAD, hypercholesterolemia, hypertension, diabetes mellitus and sedentary lifestyle. Smoking was significantly associated with CAD in men. Social class 1, 2 and 3 in an urban population of India have a higher prevalence of CAD and coronary risk factors hypercholesterolemia, hypertension, diabetes mellitus and sedentary lifestyle in both sexes.

Lehman et al., (2009) present a model to help explain these links and relate the model to blood pressure change over a 10-year period in the Coronary Artery Risk Development in Young Adults sample. Participants (N = 2,738) completed measures of childhood family environment, parental education, health behaviour, and adult negative emotionality. Structural equation modeling indicated that family environment was related to negative emotions, which in turn predicted baseline DBP and SBP and change in SBP. Parental education directly predicted change in SBP. Although African American participants had higher SBP and DBP and steeper increases over time, multiple group comparisons indicated that the strength of most pathways was similar across race and gender. Low CSES
and harsh family environments help to explain variability in cardiovascular risk. Low CSES predicted increased blood pressure over time directly and also indirectly through associations with childhood family environment, negative emotionality, and health behaviour.

Sonia Anand (2006) studied the relationship between social disadvantage, cardiovascular risk factors, and cardiovascular disease (n=1227) among men and women from diverse ethno-racial backgrounds. Socio-economic factors, conventional and novel CV risk factors, atherosclerosis, and CVD were measured. A social disadvantage index was generated and included employment status, income, and marital status. Social disadvantage was examined in relation to risk factors for CVD, atherosclerosis, and prevalent CVD. Social disadvantage was higher among older people, women, and non-white ethnic groups. Cigarette smoking, glucose, overweight, abdominal obesity, and CRP were higher among individuals with higher social disadvantage, whereas systolic blood pressure, lipids, norepinephrine, and atherosclerosis were not. Social disadvantage is an independent predictor of CVD after adjustment for conventional and novel risk markers for CVD. The social disadvantage index combines social and economic exposures into a single continuous measure. Significant variation in social disadvantage by age, sex, and ethnic group exists. Increased social disadvantage is associated with an increased burden of some CVD risk factors, and is an independently associated with CVD.

Butler et al. (2007) conducted a study to determine the impact of psychosocial factors of multiple role strain, womanist identity, and John Henriyism active coping on the general health and cardiovascular risk of African American women, based on demographic characteristics. Data were collected from a community sample of 196 African American female
participants (ages 20-65), hierarchical regression analysis revealed that SES has significant effects when considering all the independent variables on general health. No significant effects were found when considering all the independent variables on general health. No significant effects were found when considering all the independent variables in cardiovascular risk. One of the implications in this study is that counselling with African American women with low SES could assist them in managing psychosocial stressors and mitigate the negative impact of this stress on their health.

Skykes, Hanley, Boyle, Higginson and Wilson (1999) assessed the adjustment achieved by patients following discharge from coronary care and the role of socioeconomic status (SES), social environment (SE) and depression in achieving that adjustment. 287 patients were enrolled. The SE into which the patients were to be discharged was rated significantly poorer for patients of lower SES, who also scored higher on depression. At 1, 6, 12 months post discharge, lower SES patients recorded significantly poorer levels of adjustment across a range of functioning. Pre-discharge depression together with measures of SE and SES, determined 10%-28% of the variance in 12 month post discharge adjustment. Their results suggest the importance of identifying patients at greater risk for less than optimal outcome (those lower in SES and higher in depression) and the need to address the nature of the SE in which the patient has to affect his/her recovery.

Redford Williams et al., (1992) looked at the survival rates of male and female patients with CAD and found that high income patients had nearly double the survival rate of low-income patients. Linda Fried and her associates (1998) reported that older people with incomes of less than
$50,000 a year were nearly twice as likely to die of CVD as those with incomes of $50,000 or more.

Yu et al., (2000) showed that socioeconomic level-defined as education, occupation, income and marital status - related to such cardiovascular risk factors as blood pressure, body mass index and cigarette smoking. These findings suggest that people who lack financial or educational resources are probably less able or less likely to seek medical care conditions that place them at a greater risk for a variety of disorders, including heart disease.

**Socioeconomic status and cancer**

Lipkus et al., (2004) report on factors related to interpretation of feedback on genetic susceptibility to lung cancer among 371 African American smokers receiving care in a community health clinic, with a focus on whether smokers were interpreting feedback consistent with a defensive processing or an accuracy orientation. Smokers were given feedback on the absence (indicating increased risk) or presence (indicating average risk) of the gene for the mu isoform of glutathione S-transferase. Smokers who were told they were at higher risk were more likely to inaccurately recall the result than those deemed at average risk. Smokers who inaccurately recalled the result, regardless of risk status, were most likely to misinterpret the meaning of the result. Perceived lung cancer risks and worries were not associated with comprehension of the test result.

Lundin et al., (1995) conducted a case-control study based on data from the vaginal cytologic survey of Memphis, Tennessee, which reached all levels of the city, is used to relate the etiology of cervical cancer to
socioeconomic status, age at 1st marriage, and age at 1st pregnancy. Among never-married white women, 6.5 cases of SCC would be statistically expected, 0 were found. Among never-married black women 3.5 would be expected, 1 was found. For intraepithelial carcinoma (IC) 10.4 cases would be expected for whites and 5 were found, 6.6 expected for nonwhite, 3 found. Among married whites, cases of SCC and IC were roughly the same as expected but age at marriage under age 18, expected cases of SCC were 25.8, observed were 48., expected IC was 34.9, observed was 66. Among nonwhites, expected SCC for women married under 18 was 38.0 observed was 37, expected IC 38.4, observed was 36. The expected and observed cases gradually came into agreement until age at 1st marriage reached 25+. Then for whites expected SCC was 25.1 and observed was 14, for nonwhites expected SCC was 12.3 and observed was 7. For IC, expected for whites were 27.7, observed 17 and for nonwhite 6.6 expected and 10 observed. For white women similar figures showed age at 1st pregnancy and socioeconomic area of residence are definitely associated with histologically confirmed cases of invasive and intraepithelial carcinoma of the cervix as well as with unconfirmed cases with suspicious and positive cytologic findings. For nonwhite women, although age at 1st marriage is not associated with either form of cancer, early pregnancy is associated with invasive cervical cancer as well as unconfirmed cases with suspicious or positive cytologic findings. Age at 1st pregnancy and marriage were highly correlated. The data are consistent with the view that age at 1st pregnancy, alone or in conjunction with early marriage, is a determinant of cervical cancer. Number of pregnancies was not related. It is possible an unidentified 3rd factor is responsible.
Eiliv Lund et al., (2003) studied the association between socioeconomic status, operationalized as years of completed schooling, and breast cancer mortality in a Norwegian cohort. A total of 425,884 currently married women, aged 35–54 years at the Norwegian Census in 1970, were followed through 1985. No relation was found between level of education and breast cancer mortality.

MARITAL STATUS

Marital status and cardiovascular disease

Zhenmei Zhang (2006) examines the effects of marital history on the burden of cardiovascular disease in midlife. Results suggest that, in midlife, the continuously married and the never married are among the healthiest in cardiovascular outcomes. People with multiple marital losses are the most vulnerable group. People with multiple marital losses have a higher likelihood of cardiovascular disease and will need significant formal and informal care as they advance into old age.

Drawing on 5 waves of the Health and Retirement Study, Zhenmei Zhangg, Mark Hayward (2009) examined the influence of the marital life course on the prevalence and incidence of cardiovascular disease among 9,434 middle-aged individuals. Results show that compared to continuously married persons, both men and women with a marital loss have significantly higher prevalence of cardiovascular disease at baseline. Men and women, however, differ in the effects of marital loss on the incidence of cardiovascular disease over the course of the study. Women with a marital loss have a higher risk of cardiovascular disease in late midlife compared to continuously married women, whereas marital loss is not associated with men's risk of cardiovascular disease. Emotional distress and
socioeconomic status account for the higher risk of cardiovascular disease among divorced women.

In women, marital stress has been shown to have a significant effect on cardiovascular health. Women admitted to the hospital with an acute coronary event and who reported marital stress at baseline had a worse prognosis than did those who did not report marital stress. Moreover, women with severe marital stress had a threefold greater risk for a new coronary event than who did those not experiencing marital stress. For women with CVD, the stress of marital conflict more than tripled their chances of unstable chest pain or heart attack (Orth Gomer et al., 2000).

**Marital status and cancer**

In regard to cancer incidence, various studies found that married people had a low incidence of cancer (Reynolds and Kapan, 1990), that they had a high incidence of cancer (Zonderman, Costa and McCrac, 1989), and that the findings probably varied with cancer site, gender, and ethnicity (Swaneons, Belle and Satariano, 1985), no effect of marriage on recurrence was found (Burman and Margolin, 1992).

In regard to survival, studies showed a small effect of better survival for married women (Goodwin, Hunt, Key and Samet, 1987), but only when they are young (Neale, Tilley and Vernon, 1986) and not for older women (Cassileth, Walsh and Lusk, 1988). However, there is also evidence for shorter survival for married women (Ell, Nishimoto, Mediansky, Mantell, and Hamvitch, 1992) and of no relation between survival and being married (Dean and Surtess, 1989) the results are inconsistent, possibly because cancer site, gender and quality of marriage have not been considered.
Kvikstad and Vatten (1996) conducted a population based nested case-control study of cancer, conducted in Norway, studied the difference in the risk of cancer and survival between women in their first marriage with women who never married. Unmarried women had an overall increased cancer risk, which could be attributed to cancer of the ovaries, uterus, brain and hematological malignancies. For cervical and thyroid cancer, the risk was lower than for married women. In the survival analysis, unmarried cases had an overall 26%, increased risk of dying, after adjustment for age and stage at diagnosis. The increased death rate was seen for cancer of the cervix, lung, and thyroid. Since most unmarried women were nulliparous, this might explain their increased risk of ovarian and uterine cancer. Considering all factors (cancer itself being a reason for being unmarried) the investigators observed a lower survival in unmarried women.

Psycho-social factors, including the family environment, where patients receive emotional support from their spouse and children, and their hobbies and habits, may influence the duration of survival in surgically treated breast cancer patients (Tominaga et al., 1998).

Oystein Kravdal (2000) assessed marital differentials in survival from 12 common types of cancer by estimating a mixed additive–multiplicative hazard regression model on the basis of individual register and census data for the whole Norwegian population. The excess all-cause mortality among cancer patients compared with similar persons without a cancer diagnosis is, on the whole, more than 15% higher for never-married men, never-married women and divorced men, than for the married of the same sex. Other previously married have an excess mortality elevated by about 7%. This protective effect of marriage is not due to stage, which is
controlled for. The possible importance of treatment and host factors is discussed.

Sexual behaviour and reproduction also contribute to the development of cancer, and about 7% of cancer is attributable to these factors (Doll and Peto, 1981).

Women who have sexual intercourse at an early age and have many sexual partners are at elevated risk for cancers of the reproductive tract (Levy, 1985). These cancers constitute less of a risk than breast cancer. Furthermore, women who complete pregnancies before age 20 are at decreased risk for breast cancer compared to women with later pregnancies and to women who do not bear children. Thus, early intercourse prevents a risk for cancer, but early pregnancy is a protection against cancer.

Mandana Ebrahimi (2002) investigated the risk factors for breast cancer in Iranian women. 286 women with breast cancer and 249 control women were interviewed. In multivariate analysis, only marital status (never married, widowed/divorced) and family history (positive family history of breast cancer) were associated with significantly increased risk for breast cancer. The findings of the present study suggest that family history and marital status may have an impact on the incidence of breast cancer in Iranian women.

**SOCIAL SUPPORT**

Social support is a complex construct encompassing diverse dimensions, including sources, types, and appraisal of social support, that
should each be assessed. Social network characteristics (eg. the number of people from whom an individual can draw different types of support) have shown to positively influence the immune system and improve factors related to morbidity and mortality (Cohen and Herbert, 1996., Robles and Kiecolt-Glaser., 2006).

Social ties and relationships with others have long been regarded as emotionally satisfying aspects of life. Recently, the possibility that they may also mute the effects of stress and help an individual cope has been explored by stress researchers with promising results. Social support is been defined as information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations (Cobb, 1976).

Considerable evidence indicates that social support has beneficial effects for:

- cardiovascular systems
- endocrine functioning (eg. Catecholamines)
- a strong immune response (Uchino, Cacippo & Kiecolt-Glaser, 1996).

In view of such findings, people must reach out to others to provide them with emotional support and learn to be open to the emotional support that others might offer.

There is considerable evidence to suggest that social support influences health status, health behaviour, and use of health services (House, Landir and Umberson, 1988).
William et al., (2000) maintain that social hierarchy is the determining factor in the health of large populations largely because it promotes differences in stress or the ability to cope with stress. For example, as Japan has risen to the top ranks of the economic hierarchy of nations in the late 20th century, Japanese life expectancy improved dramatically. They noted that something lies behind this rapid increase in longevity and the major change was the hierarchical position of Japan relative to the rest of the world. However Okinawans traditionally rank at the top in health and life expectancy and at the bottom in socioeconomic indicators. The social gradient thesis does not apply in Japan and suggest that what is more important for health are health lifestyles, especially diet and social support. More research is needed to assess the validity of the social gradient thesis if it is to be used on a cross-national basis.

In regard to size of social network, studies show no relation to incidence (Reynolds and Kaplan, 1900), recurrence (Cassileth et al., 1985) or survival. In contrast, active social participation and active involvement have a positive effect on reduced recurrence (Hislop, Waxler, Coldman, Elwood and Kan, 1991).

Dalgard et al., (1995) found that a good social support system, such as having one or more close friends or neighbours, decreases the effects of stressful life events, prevents the worsening of anxiety and depression, and thus helps to maintain a person’s mental health.

Research on subjective well-being indicates the many benefits of interpreting daily life in positive terms, being engaged in your work and in leisure activities, feeling a sense of purpose, and hoping for positive future outcomes (Myers and Diener, 1995).
Social support and cardiovascular disease

Beverly Brummett and her colleagues (2001) found that CAD patients who had only 1-3 people in their social networks were nearly two and half times more likely to die of CAD than patients with four or more close friends. Patients recovering from heart disease, as well as their spouses, often experience a variety of psychological reactions that include depression, anxiety, anger, fear, guilt and interpersonal conflict. For cardiac patients, the most common psychological reaction to a myocardial infarction is depression.

Thomas et al., (2006) conducted the study to assess the relationship between social network size and prospective mortality risk among a large sample of older, Caucasian women. The study included 7524 Caucasian community-dwelling women, age 65 or older (mean age = 74.1), who participated from four U.S. communities. Participants were followed for an average of 6 years after they had completed the year-2 assessment. A total of 1451 deaths (19.3 % of sample) were observed over follow-up, 215 (3.4%) due to cardiovascular causes. Higher social network scores were a robust predictor of lower multivariate-adjusted mortality (95%), controlling for age, comorbid disease, body mass, smoking, depression, and education. However, social network benefits were attenuated after controlling for marital status. Married participants showed lower total and CVD covariate-adjusted death rates compared with unmarried participants. Social network scores and marriage were each associated with reduced prospective mortality risk among older women. The relationships shown here suggest that much of the protection afforded by larger social networks in older women results from marriage rather than other forms of social relationships.
Social support and cancer

“The buffering hypothesis” that social support may shield cancer patients from the effects of life stress on their emotional distress is supported (Koopman et al., 1998). Lack or less of social support has been proposed to affect the onset and course of cancer (Sklar and Anisman, 1981).

A long-term study of factor related to cancer incidence, mortality, and prognosis in Alameda County, California, found that women who are socially isolated were significantly elevated risk of dying from cancer of all sites (Kaplan and Reynolds, 1988).

The positive and negative impacts of social support on cancer patients have also been studied. Patients with head and neck cancer were found to be more prone to psycho-social problems and social support might influence the patient’s ability to adapt to the illness and its treatment (De Leeuw et al., 2000).

Craig and Jayne (2005) examined hope in a sample of women diagnosed with breast cancer in relationship to independent variables of Social support, Resiliency and Self-esteem. The study also examined the relationship between social support and hope in women with breast cancer. In model I, resilience was tested as a mediation variable in relationship between social support and hope and in Model II, self esteem was tested as the mediation variable. The research design was a correlation study. A convenience sample of 317 women diagnosed with breast cancer, aged 40-70 years, was obtained by visiting support groups. Participants completed the Demographic Data Sheet and 4 instruments: The Herth Hope Index, the
PRQ-85 part 2, the resilience Scale and the Rosenberg Self-Esteem scale. Positive correlations were found between hope and independent variables of social support, resilience and self esteem. Positive correlations were found between social support and hope, given that the relationship between social support and hope remained statistically significantly in the analysis. The testing of these theorized relationships added to nursing knowledge for women with breast cancer. Since neither of the mediation models helped to explain the relationship between social support and hope in women with breast cancer, it may be worthwhile to examine other variables that may help to explain this relationship.

Schmidt et al., (2004) investigated psychological adjustment as a function of emotional intelligence, social support, and social constraints in 210 patients recruited via postings to Internet-based breast cancer support groups. Regression analyses indicated high social constraints and low emotional intelligence were associated with greater distress. Evidence suggested high emotional intelligence could buffer against the negative impact of a toxic social environment. Results support a social-cognitive processing model of adaptation to traumatic events and suggest consideration of emotional intelligence may broaden this model.

Fogel et al., (2002) investigated the potential psychological benefits of Internet use for medical information by breast cancer patients. Of the 251 women approached, 188 were successfully interviewed (74.9%). Forty-two percent used the Internet for medical information related to breast health issues and did so for an average of 0.80 hr per week. The Interpersonal Support Evaluation List and the UCLA Loneliness Scale, with results controlled for covariates, showed that Internet use for breast health issues was associated with greater social support and less loneliness than Internet
use for other purposes or nonuse. Breast cancer patients may obtain these psychological benefits with only a minimal weekly time commitment.

High levels of reported social support have been positively associated with functional immune parameters in a number of populations at risk for stress related immune suppression, including cancer patients (Levy et al., 1990). Spouses of cancer patients (Baron, Cutrona, Hicklin, Russell and Lubaroff, 1990) and individuals reporting high levels of general stress (Schlesinger and Yodfat, 1991). These effects have been attributed to the ability of a strong social support network to minimize or buffer. Stress related decreases in immune function, perhaps by modulating stress effects on biological activities lies endocrine function or effects on behaviour such as sleep or diet.

Neville (1998) tested the relationship between perceived social and familial support, feelings of uncertainty and relationships with health professionals among adolescents with cancer. The study concluded that there was an inverse relationship between perceived social/ familial support and uncertainty, a positive relationship between uncertainty and psychological distress. An interaction effect of perceived social support and uncertainty was found to explain 39% of the variance of psychological distress.

Weavers et al., (2007) examined 2 potential factors structures of the Benefit Finding Scale using confirmatory factor analysis, a single factor model with all items loading on a common factor and a multiple factor model, paralleling dimensions previously identified in the literature. Models were tested in 4 samples of medical patients: prostate cancer (n=185), breast cancer (n=110), AIDS (n=117). The single factor model
was a poor fit for the data in all 4 samples. Six factors (Acceptance, Family relations, personal growth, World Wide View, Social Support, and Health Behaviours) derived through content analyses compromised the multiple factor model. Socio-demographic and disease related predictors were differentially related to BF factors across studies. These results suggest an alternate framework for the assessment of benefit finding using a multidimensional approach that may generalize across populations.

Barrie et al., (2008) studied a heterogeneous sample of 201 cancer patients and their relatives to determine compatibility of psychological status and to isolate clinical and demographic variables associated with psychological distress. Self-report tests of anxiety, mood disturbance, and mental health were applied. Despite large individual variation, the psychological status of patients and their matched relatives was closely correlated. The patient's treatment status affected both patients and their next-of-kin. Psychological well-being worsened according to whether patients were receiving follow-up care, active treatment, or palliative therapy. These data suggest a mutuality of psychological response between patients and their families. Supportive intervention for the patient or relative who manifests distress, therefore, should benefit both. Because patients and relatives involved with palliative treatment are most in need of psychological assistance, particular attention should be paid to this group, as is attempted in hospice care.

Yu et al., (2006) examine the experience of Chinese-American women with breast cancer among several constructs-languages, sense of well-being, social/emotional support as well as religious/spiritual support. Findings suggest that Chinese-American women with breast cancer appear to have better adjustment to their illness when they perceive themselves to
have higher English Proficiency, sense of general well being and both social support and religious/spiritual support. Despite the small sample size of the study, the implications of the general findings remain meaningful as an initial attempt to better understand the experience of breast cancer among Chinese-American women.

Achterberg et al., (1977) compared two groups of cancer patients with well matched diagnoses. Both groups had received diagnoses of terminal or widely metastatic disease, but the exceptional group had significantly outlived the predicted life expectancy. The other group died within the predicted number of months. The two groups were significantly different on scales which would indicate the exceptional cancer patients were more flexible and non-conforming, had more psychological insight, and refused to give up or decompensate in the face of stress. Additionally, they exhibited more ego strength and self-sufficiency. These preliminary results are summarized in the context of other research which indicates the course of cancer is related to patients' psychological functioning: leading to the conclusion that psychotherapeutic support systems should be an integral part of cancer treatment.

Carpenter and Kristen (2006) tests social support as a moderator between health status and psychological outcomes, specifically, it tests the stress-buffering hypothesis, which states that those under the most stress benefit from social support. The study documents various dimensions of cancer—related QOL in a sample of gynecologic cancer survivors. Patients demonstrated compromised health status, with scores generally in the range of cancer patients in active treatment or immediate follow up 7 evidence of a variety of longstanding symptoms. The patients do not have exceptionally high levels of psychological distress or traumatic stress, though significant
proportion (8%-15%) reported symptoms in the clinically significant range. The hypothesis that poorer cancer related health status would be associated with poorer psychological outcomes was unequivocally supported. The results for the psychological distress outcome indicated that those with better social support reported less psychological distress. Regarding the traumatic stress outcome, there is no evidence for a direct relationship and social support however; results did provide evidence for stress buffering. Specifically, perceived social support from friends and perceived availability of social resources appeared to protect patients from traumatic stress symptoms associated poor physical health status.

Sense of Coherence (SOC), approach and avoidance coping and QOL were examined in 60 breast cancer survivors from the Birmingham, Alabama metro area who were finished with active chemotherapy/ and or radiation therapy treatment and were atleast one year post diagnosis. In addition, SOC’S prediction of salivary cortisol responses and reactivity, as well as natural killer cell activity was explored. Questionnaire data were gathered from all 60 participants, as were saliva samples at three time points during the same morning session. 28 of the 60 participants also donated a blood sample to be used for the NKCA assay. All participants watched a 27 minute video on the cancer experience that was designed to evoke an emotional stress response. It was found that SOC directly predicted QOL. It was also found that avoidance coping partially mediate the SOC-QOL relationship such that women who were higher on SOC used fewer avoidance coping strategies, and in turn, experienced better QOL. Though not statistically significant, the analyses also showed a tendency toward those with a higher SOC to stressor, some of the salivary cortisol levels actually decreased from the baseline levels. This phenomenon has
been reported in other studies but the reason for this pattern has not been determined as yet (Ebert and Sheryl, 2007).

Cancer patients often refer to their need for emotional support, which is widely believed to positively affect the course of disease. In one study, perceived family support did not predict recurrence (Levy, Heberman, Lippman, D’Angels and Lee, 1991).

However, shorter survival was related to feeling isolated and lonely (only in women) and to having few contacts in men (Reynolds and Kaplan, 1990) as well as to having a need for emotional support (Stavraky, Donner, Kincade and Stewart, 1988), whereas longer survival was related to perceived adequacy of family support (Stavraky et al., 1988) and to getting adequate emotional support (only in women) (Ell et al., 1992).

It is likely that social participation positively effects survival and disease progression because it hastens diagnosis (Neale et al., 1986) and promotes compliance with treatment (Richardson, Shelton, Krailo and Levins, 1990).

Women who were rated by others as exhibiting low level of distress, who reported being fatigued and who complained about a lack of social support within their families tend to have lower levels of NK activity (Levy et al., 1985). The association between psychosocial variables and reduced NK activity in breast cancer patients was later confirmed by Levi et al., (1987). These investigators found that they could account for 30% of NK activity level variance at 3 months follow-up on the basis of baseline NK activity, fatigue or depression and lack of social support.
Helgenson and Cohen, (1996), Micheal et al., (2002), Pistrang and Barker, (1995) suggest a strong relationship between social support and adjustment to cancer. In general, individuals who report social support have lower levels of distress and use more adaptive coping techniques compared to those who report less social support (Manne et al., 1999). Individuals reporting greater social isolation are more adversely affected but cancer, such that they experience decreased physical functioning, lower ratings of their quality of life, and increased fatigue (Michael et al., 2002).

There is some evidence that social support may also serve as a buffer against disease progression (Smith et al., 1994). Higher levels of social support are associated with better survival outcomes and greater psychosocial adjustment for women diagnosed with cancer (Goodwin et al., 1987, Maunsell, Brisson and Deschenes, 1995).


**WORK STRESS**

**Work stress and cardiovascular disease:**

A study by Schnall (1990) found that workers who faced high psychological demands without having much control over day-to-day decisions had 3 times the risk of having blood pressure. All of these chronically stressed workers had thickened or enlarged hearts.
Xu and Liying (2004) tested the psychometric properties of the 5 established stress models: Effort- Reward Imbalance model, Job Strain model, Social Support Scale, Perceived Stress Scale, Family Strain Scale. The three sample group were 421 working women in Beijing China, 103 patients of both genders with hypertension and 10 control subjects in Hong Kong and 187 Chinese American residents of San Francisco, USA. The results of study one demonstrated that the internal consistency of Effort-Reward Imbalance, perceived Stress Scale, Social Support Scale and Family stress Scale was satisfactory and that the theoretically postulated structure of the scales of the work stress questionnaires can be replicated. Effort-reward imbalance, job strain as well as family strain were each significantly associated with increased systolic blood pressure and diastolic blood pressure. Dual exposure to stress at work and family stress was significantly associated with a further increase in both systolic and diastolic blood pressure. Symptoms of suspected heart disease and recurrent sleeping problems were associated with all subscales of the study instruments expect for the job support and attachment subscales. The hypothetical model of Effort-reward imbalance and Job strain were not supported in this HK case control study. However, those who worked in a private sector having dependent children had increased risk for development of hypertension. In the San Francisco study, high psychological job demand holding a second job were independent risk factors for increased IMT in the adjusted models. There is also evidence that family strain and working context have independent effects on psychosomatic health and CVD risks in the population of Chinese working women.

Melamed et al., (2006) present evidence supporting several potential mechanisms linking burnout with ill health, including the metabolic syndrome, dysregulation of the hypothalamic-pituitary-adrenal axis along
with sympathetic nervous system activation, sleep disturbances, systemic inflammation, impaired immunity functions, blood coagulation and fibrinolysis, and poor health behaviours. The association of burnout and vital exhaustion with these disease mediators suggests that their impact on health may be more extensive than currently indicated.

Byrne et al., (2008) reviews the evidence from the simple notion of occupational level and type as a risk through to the more theoretically sophisticated models of occupational stress as a determinant of cardiovascular risk and disease. It maps measures of occupational stress against the three related end points of coronary risk profiles, hypertension and clinical cardiovascular disease.

**Work stress and cancer**

Andersen et al., (2009) examined the long-term effects on women's health related quality of life (HRQOL) of involvement in decision-making about their treatment for breast cancer and about follow-up care after treatment. Using a cross-sectional survey design, a sample of breast cancer survivors from Western Washington who were 2, 5, and 10 years post-diagnosis were recruited via a cancer registry and interviewed about their HRQOL and their involvement in decision-making about their cancer treatment and follow-up care. Multiple regression analyses examining demographic and disease characteristics revealed age, and education, but not stage of cancer at diagnosis, to be significant predictors of perceived involvement in decision-making about cancer treatment and follow-up. Controlling for demographic and disease characteristics, perceived involvement in decision-making about treatment overall, surgery,
chemotherapeutic treatment, and follow-up care were each associated with improved HRQOL, including the general health and vitality subscales of the SF-36 (p < .05). Involvement in decision-making about surgery was also associated with better mental health among survivors of breast cancer. Congruence of involvement in decision-making with a patient's preferred level of involvement was also associated with improved survivor HRQOL on several subscales. Perceived involvement in decision-making about breast cancer treatment, and about follow-up care is associated with better HRQOL for survivors 2, 5, and 10 years post diagnosis.

Bu-Tian Ji (2008) examined the relationship between occupation and breast cancer risk. Cases were 586 women previously diagnosed with breast cancer at baseline and 438 women newly diagnosed with breast cancer during follow-up. Eight controls were randomly selected for each case from cancer-free cohort members and frequency-matched to the cases by year of birth and age at diagnosis. Logistic regression was used to estimate breast cancer risk associated with occupations, adjusting for established breast cancer risk factors. In the prevalent breast cancer data analysis, increased risks of breast cancer were associated with technicians in engineering/agriculture/forestry, teaching personnel, tailoring/sewing workers, and examiners/measurers/testers among those who started the jobs at least 20 years ago. Among incident breast cancer cases, significantly increased risks were associated with medical/health care workers, administrative clerical workers, postal/telecommunication workers, and odd-job workers among those who started the jobs at least 20 years ago. The excess risks were found in both prevalent and incident cases for postal/telecommunication workers and purchasing/marketing personnel. This study suggests that white-collar professionals and several production occupations may be associated with an increased risk of breast cancer.
Deborah (2009) conducted a case-control interview study among 232 North Carolina women with oral or pharyngeal cancer and 410 matched controls to evaluate the contribution of occupation to the high risk of this cancer among females in the South. The detailed occupational histories found no overall elevated odds ratios for employment in the textile, apparel, or hosiery industry, the major employer of women in the area. Risks also did not increase with years worked in the industry. The findings thus fail to confirm an association reported in surveys in the United States and Great Britain. A new clue to occupational factors was suggested by the excess risk associated with the electronics industry in coastal North Carolina, independent of the participants' tobacco habits.

Lundberg et al., (1998) suggested that women in traditionally male occupations exhibit the same level of stress hormones as do men in similar jobs. In addition, where women feel equally or more threatened by the stressors than men their physiological response matches that of men. These findings suggest that social and cultural processes may drive some of these differences.

Sophie Fossa et al., (2008) explored work engagement in employed tumour-free cancer survivors (CSs) compared to matched controls from the general population (NORM). The sample consisted of 446 CSs tumour-free after primary treatment [226 females with breast cancer and 220 males (166 testicular cancer and 54 prostate cancer)] diagnosed 2–6 years prior to the study. All had returned to work and had favourable prognosis. NORM sample consisted of 588 employed controls (319 females, 269 males). No differences in work engagement were observed between the CSs and NORM measured by the UWES total scale score or by the Dedication and Absorption domain scores. The CSs reported significantly poorer work
ability, poorer health status, greater numbers of disease symptoms, more anxiety, and reduced physical quality of life, and scored significantly higher on both neuroticism and extraversion. In spite of poorer health CSs who had returned to work after their treatment for breast, prostate, and testicular cancer showed similar work engagement as individuals without cancer. In such CSs employers have no reason to expect reduced work engagement.

**Cardiovascular diseases and diabetics**

Based on 20 years of surveillance of the Framingham cohort relating subsequent cardiovascular events to prior evidence of diabetes, a twofold to threefold increased risk of clinical atherosclerotic disease was reported. The relative impact was greatest for intermittent claudication (IC) and congestive heart failure (CHF) and least for coronary heart disease (CHD), which was, nevertheless, on an absolute scale the chief sequela. The relative impact was substantially greater for women than for men. For each of the cardiovascular diseases (CVD), morbidity and mortality were higher for diabetic women than for non-diabetic men. After adjustment for other associated risk factors, the relative impact of diabetes on CHD, IC, or stroke incidence was the same for women as for men, for CVD death and CHF, it was greater for women. Cardiovascular mortality was actually about as great for diabetic women as for diabetic men (William Kannel., Daniel McGee, 1979).

Deborah (2009) examined whether a history of gestational diabetes mellitus (GDM) further increases the risk of cardiovascular disease (CVD) in parous women with first-degree relatives with type 2 diabetes. Women with (n = 332) and without (n = 663) a history of gestational diabetes mellitus were compared regarding the revised National
Cholesterol Education Program Adult Treatment Panel III metabolic syndrome criteria, the prevalence of type 2 diabetes, and self-reported cardiovascular disease. Women with prior gestational diabetes mellitus were younger and less likely to be postmenopausal. Although both groups were obese, women with prior gestational diabetes mellitus were more likely to have metabolic syndrome and type 2 diabetes. Moreover, they had a higher prevalence of cardiovascular disease that occurred at a younger age and was independent of metabolic syndrome and type 2 diabetes. Among women with a family history of type 2 diabetes, those with prior gestational diabetes mellitus were even more likely to not only have cardiovascular disease risk factors, including metabolic syndrome and type 2 diabetes but also to have experienced cardiovascular disease events, which occurred at a younger age. Thus, women with both a family history of type 2 diabetes and personal history of gestational diabetes mellitus may be especially suitable for early interventions aimed at preventing or reducing their risk of cardiovascular disease and diabetes (Cardiology today, 2007).

The prevalence of hypertension in diabetics is about three times than observed in the general population. Diabetes alone is equivalent to two cardiovascular risk factors. Hypertension in diabetic patients contributes nephropathy, retinopathy and increases the risk of macro vascular complications such as myocardial infarction, congestive heart failure and stroke. An increase of 5 mmHg is 5- times more common in hypertensive diabetics. The American Diabetics Association, National Kidney foundation and the Joint National Committee VII recommended a blood pressure target of 130) 80 mmHg in diabetics. However, only 5% diabetics have their hypertension controlled to optimal target level. Hypertension is difficult to control in diabetic patients and often requires multiple antihypertensive drugs for aggressive BP control.
Diabetes Mellitus (DM) is associated with a markedly increased prevalence of coronary artery diseases (CAD). The overall prevalence of CAD, as assessed by various diagnostic methods, is as high as 55% among adult patients with DM, compared with 2% to 4% for the general population. The diabetic population is particularly challenging for percutaneous coronary revascularization because of specific high risk clinical and angiographic features. Long term events were related not only to revascularization failures but also to progression of coronary disease and over-all risk of diabetics (Cardiology today, 2009).

COMPLEMENTARY / ALTERNATIVE THERAPIES FOR CARDIOVASCULAR DISEASES AND CANCER

Complementary / alternative therapies and healing practices have been found to reduce stress, anxiety, and lifestyle patterns known to contribute to cardiovascular disease and cancer. Promising therapies include music, imagery and hypnosis, meditation, yoga, tai chi, prayer, exercise, diet, and use of dietary supplements. Many of these complementary approaches to healing have been within the domain of nursing for centuries and can readily be integrated into the care of patients with cardiovascular disease and cancer. While individual complimentary modalities hold considerable merit, it is critical that the philosophy underlying these therapies - caring, holism, and harmony - also be understood and honored.
MUSIC THERAPY

Music exalts each joy, allays each grief,
expels disease, softens every pain,
subdues the range of passion and plague.

- John Armstrong, 1759

Music, the language of the soul, is as old as humanity. Music is the gift of god in human life, which has the power to communicate with everybody. Music is a great stress reliever and can easily identify with the emotions and inner feelings of human being. Music has been used in medicine for thousands of years. Ancient Greek philosophers believed that music could heal both the body and the soul. The therapeutic benefits of music can be traced back in time to ancient shamanistic rituals. Throughout the history of human development, music in some form has been used as an important aid to healing. Schullian and Schoen describe references to the divine alliance of music and medicine in classical antiquity and the healing function of music among primitive peoples. Beneficial effects of music have been recognized by the ancient Greeks and Romans, including Pythagoras, Democritus, Aristotle, Galen, and Celsus, and Plato, Cicero, and Seneca all believed that music profoundly affected the behaviour of entire societies and that the state should regulate the performance of certain types of music. Similarly, traditional Chinese medicine refers to the qualities of specific instruments and sounds and their beneficial effects on various organs of the body. From these early beginnings to the present day, interest in music as an adjunct to the healing or therapeutic experience has been sustained (Bartlett, 1996).
Music as a healing touch used during age old times, as a means of therapy. Music Therapy is a comparatively newer concept of alternative medicine to fight with many diseases. Music therapy is based on the associative and cognitive powers of the mind. Sound creates vibrations on the eardrum, which is picked up by the auditory nerve and sent to the brain and redistributed throughout the neuron network.

Music therapy has the potential for multidimensional influence on the physical, psychological, social and spiritual aspects of a patient's life. Physically it promotes muscular relaxation, helps to relieve pain and facilitates physical participation. Psychologically it can alter the patient's mood including the easing of anxiety and the lessening of depression. It provides a nonverbal means of expressing feelings. Music enhances communication and helps the patient to recall past significant events. Socially it provides an opportunity to participate in a group and to lessen isolation. It can be used as a bond promoting a sense of community with family members and others. It can also promote healing during the family's grief process. Spiritually it provides an avenue to search for the meaning of life and helps the patient to accept the dying process by easing the fear of death. Music can inspire hope. Music therapy has a great deal of potential for meeting the needs of the terminally ill and their families. In the future, music therapy is expected to be used more widely and more effectively not only in terminal care but also in the field of psychosomatic medicine (Cicely Saunders, 1993).

Different kinds of music work in different ways. While western classical music or Indian traditional music can work wonders with terminally ill patients, bhajans and satsangs can help patients recovering
from brain hemorrhages or heart attacks. Even percussion instruments like drums can help relieving stress (The Financial Express, 2007).

Researchers and clinicians have demonstrated that music therapy can improve health outcomes in surgery, cardiology, obstetrics, and oncology. Increased relaxation, decreased anxiety and pain, and improved mood are some of the positive outcomes associated with music therapy interventions (Aldridge, 1993, Standley, 2000).

Bruscia (1998) delineates four types of music therapy interventions based on the level of client involvement. The first three types-improvisation, re-creative, and composition-are interactive experiences, which involve the client composing original music or performing pre-composed music, that is, engaging in some type of musical behaviour (Bruscia, 1998). The fourth, receptive music experiences, involve a client listening to either live or recorded music, and responding with a nonmusical behaviour. There are variations within each type and each intervention can occur within a group or individual setting.

Research has shown that music has a profound effect on your body and psyche. In fact, there’s a growing field of health care known as Music Therapy, which uses music to heal. Those who practice music therapy are finding a benefit in using music to help cancer patients, children with ADD, and others, and even hospitals are beginning to use music and music therapy to help with pain management, to help ward off depression, to promote movement, to calm patients, to ease muscle tension, and for many other benefits that music and music therapy can bring. This is not surprising, as music affects the body and mind in many powerful ways (Elizabeth Scott, 2007).
Russell Hilliard (2005) reviews the empirical studies found in the literature and documents the emergence of an evidenced-based approach to the use of music therapy in hospice and palliative care. A total of 11 studies are reviewed, of these, six show significant differences supporting the use of music therapy in this area. Dependent variables positively affected by music therapy include pain, physical comfort, fatigue and energy, anxiety and relaxation, time and duration of treatment, mood, spirituality and quality of life.

Hanser and Thompson (1994) randomly assigned 30 older adults diagnosed with major depressive disorder to one of three 8-week conditions. Participants in the music condition performed significantly better than the controls on standardized tests of depression, distress, self-esteem, and mood. Results consistent with these are also reported by several other studies using a variety of methods and participant nationalities (Cevasco, Kennedy and Generally, 2005., Hilliard, 2001., Hirokawa and Ohira, 2003., Jochims, 1992., Lai and Good, 2005).

Lisa Gallagher et al., (2006) assessed the effect of music therapy on patients with advanced disease. Two hundred patients with chronic and/or advanced illnesses were prospectively evaluated. The effects of music therapy on these patients are reported. All improvements were statistically significant (P<0.001). Most patients and families had a positive subjective and objective response to music therapy. Objective data were obtained for a large number of patients with advanced disease. This is a significant addition to the quantitative literature on music therapy in this unique patient population.
Shabbir Ahmad Rana (2007) investigated the effect of rhythmic recitation of Quranic verses on depression. 175 hospitalized Pakistanis suffering from psychotic depression were divided into seven groups. All received the same drugs and attended the same psychotherapy sessions, but the participants of six experimental groups were also subjected to six other different treatments, including religious music, for 60 minutes daily over 30 days. The results indicated that the level of depression decreased in all the seven groups, but the level decreased most significantly among participants who also listened to the Quranic verses. The implication of the study rests in highlighting the positive effect of rhythmic Quranic recitation on psychotic depression among Muslims, which may contribute to the further development of cost-effective health promotion procedures in both Islamic nations themselves and multi-cultural Western nations.

Indeed, several studies have investigated the effects of music on mental health in general (Bonny, Pahnke and Walter, 1972., Yao, and Zheng, 1994), and some have focused specifically on depression. Hsu and Lai (2004) conducted a study on the effectiveness of soft music for treatment of major depressive disorder inpatients in Taiwan. A pretest-posttest design showed that listening to music resulted in significantly improved depression scores.

Schmid, Kaeder, Schmidt and Ostermann (2005) studied 20 patients aged 29-47 and found that music therapy over time led to improvements in scores concerning self-esteem, anxiety, and depression.
Music therapy and cardiovascular diseases

Shui-Tao Hu (2007) examined effectiveness of application music therapy on cardiovascular patients in intensive Care unit (ICU). The subject group consisted of 60 cardiovascular patients. The subjects were divided into two groups, 30 subjects in each group. The subjects in the experimental group received music therapy and another subjects in the control group received the routine care. Results lead researchers to conclude that implementing music therapy could effectively decrease anxiety on cardiovascular patients in intensive Care unit.

Kathy Bally et al., (2003) examined patients’ response to music during operative procedures involving spinal, epidural, or local infiltration anesthesia: 75% of the patients rated the music as helpful, relaxing, and supportive. Participants stated that listening to music helped counterbalance the feeling of depersonalization associated with being in the hospital environment. They also reported the effect of music on patients’ anxiety during flexible sigmoidoscopy. They found that music was an effective anxiolytic; state anxiety scores were significantly less in the group of patients who listened to self-selected tapes during procedures than in patients who received the standard protocol. Conversely, music in combination with muscle relaxation was ineffective in reducing anxiety in patients admitted to a coronary care unit with unstable angina or acute myocardial infarction.

Matthew Bechtold et al., (2009) conducted a meta-analysis to analyze the effect of music on patients undergoing colonoscopy. Multiple medical databases were searched. Only RCTs on adult subjects that compared music versus no music during colonoscopy were included. The
study indicated the music improves patients’ overall experience with colonoscopy.

Control of stress and anxiety and the promotion of comfort are challenges facing health practitioners involved in catheterization. The aim of this case–control study was to examine the effect of music on the levels of anxiety, stress, and depression experienced by patients undergoing coronary angiography, as measured by the 21-item Depression Anxiety Stress Scales. Differences in pre- and post-intervention scores demonstrated that there were significant decreases in mean scores of state anxiety, stress and depression in the intervention group, who listened to 20 minutes of relaxing music, as compared with the control group who had 20 minutes of bed rest (Moradipanah et al., 2009).

Some music may reduce heart rate, respiratory rate, and blood pressure in patients with coronary heart disease, according to a 2009 Cochrane review of 23 clinical trials. Benefits included a decrease in blood pressure, heart rate, and levels of anxiety in heart patients. However, the effect was not consistent across studies. Music did not appear to have much effect on patients' psychological distress (Joke Bradt and Cheryl Dileo, 2008).

**Music therapy and cancer**

Sahler (2003) was done a study with 42 patients on the bone marrow transplant unit at the James Wilmot Cancer Center. Patients ranged in age from 5 to 65 years of age, most were being treated for various types of cancer, including leukemia, lymphomas, and solid tumours. The patients who met twice each week for music-assisted relaxation and
imagery reported significantly less pain and nausea - on average, they rated both their pain and nausea 'severe' before sessions, but 'moderate' after sessions. Their new bone marrow took hold faster, too. The average time until patients began producing their own white blood cells was 13.5 days in the group receiving music therapy, compared to 15.5 days in the control group. The length of this span of time, when patients are most vulnerable to infection, is crucial.

Music Therapy programme was conducted to improve a cancer patient’s physical and emotional well-being by providing a distraction during treatment, thus decreasing stress, pain, and anxiety levels. The conclusions are engaging cancer patients in music therapy appear to have a positive effect on their emotional and physical well-being. One hundred percent (100%) of program participants somewhat or strongly agreed that music therapy decreased their stress, as well as anxiety levels, and 69% somewhat or strongly agreed that participating in the program decreased their pain level. Cancer patients who participate in music therapy seem to largely benefit from the program. One hundred percent (100%) somewhat or strongly agreed the music therapy program was beneficial / valuable to them, and all would participate again if given the chance (Clements-Cortes, 2004).

Lucanne Magill et al., (2011) piloted a program with 39 critically ill cancer patients. Pre-therapy and post-therapy scores were obtained with the Distress Thermometer, a well-validated 10-point Likert scale for measuring cancer distress. The mean distress score before the intervention was 4.6. After intervention it dropped to a mean ± SD of 2.5 ± 1.5, representing a 46% improvement. This was statistically significant (95% confidence interval of 1.6–2.9, p=.001). A qualitative thematic analysis encompassed
the following topics: faith, hope, family, meaning in life, creativity, hopelessness, abandonment, and fear of death. This feasibility study suggests a unique approach to behavioural activation for critically ill cancer patients by using combined music therapy and CBT. In addition to the therapeutic value of music, lyrics are used to generate coping statements, which are often based on memories that can be used to sustain the patient through his or her current adversity.

Reinhardt (1999) investigated the influence of music therapy upon the heart in cancer patients suffering from chronic pain. Monitoring the synchronisation and co-ordination of heart rate in cancer patients, the scientists carried out a pilot study with 28 patients suffering chronic cancer pain in a stable phase of cancer. The intervention was a 14-day training of a relaxation therapy for improving falling asleep, which included a 30-minute lullaby-like, rhythmically dominated music with gradually decreasing tempo. It was found that the music had a profound effect, the patients in the relaxation group showed an increasing synchronisation and co-ordination of heart rate and musical beat. Those patients reporting the best relaxation and analgesic effects showed the most synchronisation. Music therapy also led to an improvement of falling asleep and a decrease in consumption of analgesics. The study showed that Lullaby-like music within a specific range of tempo may induce a trainable synchronisation of heart rate, and thereby induce a relaxation and analgesic response.

Forsch Komplementarmed (1999) conducted a study on the influence of musical rhythm on synchronisation and co-ordination of heart rate. The sample was 28 patients with chronic cancer pain in a stable phase of the disease. 14-day training of a relaxation therapy designed for improving the falling asleep, including a 30-minute lullaby-like,
rhythmically dominated music with gradually decreasing tempi. No training in the control group. Relaxation therapy led to an improvement of falling asleep and to a decrease in consumption of analgesics. Lullaby-like music within a special range of tempi can induce attainable synchronisation of heart rate, functionally associated with the formation and intensity of a relaxation reaction.

There have been studies showing that music therapy can help people who've had cancer to feel less anxious, more relaxed, and to feel less pain. In a very preliminary 2001 British study of music therapy in 29 cancer patients, participants felt a higher sense of well-being and less tension during one session. Researchers measured improvements in immune function and decreases in the amount of the stress hormone cortisol. 20 patients awaiting breast biopsy showed that, when some of the patients had a 20-minute music therapy session while in the pre-operative waiting room, their anxiety and respiratory rates were much lower than those of the patients who did not have a music therapy session (Demmer, 2004).

First described in palliative care over three decades ago (Munro and Mount, 1978), music therapy has since become a widely accepted discipline that can promote resilience, control, comfort, and peace among people affected by life-threatening illnesses, including patients and their families, friends, and staff caregivers (Dileo and Loewy, 2005, Hilliard, 2005, Lee, 1995, Magill Bailey, 1984, Martin, 1989, Munro, 1984, O’Callaghan, 2006a, Rykov and Salmon, 2001). Music therapy in oncology and palliative care can be described as the professionally informed and creative use of music within a therapeutic relationship with people who have been identified as needing psychosocial, physical, or spiritual help or who desire
further self-awareness, enabling increased life quality (O’Callaghan, in press).

Cancer patients reported that songwriting was a pleasurable, helpful, unique, calming, and easy experience that allowed them to express themselves and record significant life events (O’Brien, 2005).

Huang (2007) examined the effect of music on cancer pain using a two group pre-test post-test experimental design and to examine relaxation and distraction as the mediating variables. This study tested a proportion from the Good and Moore theory that non-pharmacological interventions reduce pain. The results extended the Good and Moore acute pain theory, to include the effect of music on chronic cancer pain, and identify explanatory mechanisms. Nurses can offer soft music to supplement analgesic mediation for cancer patients with pain. Future researchers can study the effects of music for pain and other symptoms in people with specific types of cancer.

Most music and oncology studies, however, have examined the effects of receptive interventions such as music listening, music and imagery, or a combination of music therapy interventions (receptive and interactive) on outcomes such as decreasing pain and nausea, improving mood, increasing family communication, and improving quality of life (Curtis, 1986., Pfaff, Smith, and Gowan, 1989., Sabo and Michael, 1996., Sahler, Hunter, and liesveld, 2003., Tilch et al., 1999., Weber, Nuessler, and Wilmanns, 1997., Zimmerman, Pozehl, Duncan, and Schmitz, 1989).

Standley (2002) reported greater benefits associated with interactive types of therapy (e.g., music making), it might be advantageous for music therapists to create interventions that move patients from passive
involvement to a more active engagement through music making across multiple sessions. Passive music interventions could promote structure and self-regulation to decrease anxiety. Once stabilized, the intervention could then move toward a more interactive modality designed to develop new cognitive coping strategies by, for example, exploring the meaning of the cancer or behavioural coping strategies to manage symptom distress.

**YOGA/MEDITATION**

**Yoga/meditation and cardiovascular diseases**

The practice of yoga, including meditation and relaxation components, has been associated with decreases in respiration rate (Arambula, Peper, Kawakami, & Gibney, 2001), pulse rate (Telles & Vani, 2002), and oxygen consumption, as well as with an increase in breath volume (Vempati & Telles, 2002). Zen Buddhist meditation practices have been found to increase heart rate variability (Kubota, Sato, Toichi, Murai, Okada, Hayashi, & Sengoku, 2001) and to decrease serum cortisol, vital capacity, diastolic blood pressure, systolic blood pressure, and pulse rate (Sudsuang, Chentanez, & Veluvan, 1991).

One of the most popularly studied meditation techniques has been Transcendental Meditation, a practice of “restful alertness” experienced in a seated posture with eyes closed (Barnes, Treiber, & Davis, 2001).

A recent review of Transcendental Meditation and its impact on cardiovascular functioning cited evidence for its beneficial effect on blood pressure, lipids, and cholesterol (Walton, Schneider, Nidich, Salerno, Nordstrom, & Merz, 2002). Recent studies in Transcendental Meditation
showed an association not only with decreased blood pressure (Barnes, Treiber, & Davis, 2001), but also with increased heart rate variability. Perhaps most interesting was the finding that, in a controlled study, Transcendental Meditation significantly decreased exercise-induced myocardial ischemia in patients with coronary artery disease (Zamarra, Schneider, Besseghini, Robinson, & Salerno, 1996). Of interest is that a number of the studies on Transcendental Meditation were conducted with participants who had no apparent background in meditation; thus, the beneficial effects were evident despite lack of experience in meditation.

**Yoga/meditation and cancer**

Yoga may help ease anxiety in breast cancer outpatients. A study of 98 out patients assigned to receive either yoga training or a brief therapy session prior to undergoing surgery. This study also showed that daily yoga session helped manage treatment related side effects (Rao et al., 2009).

Vadiraja et al., (2009) found that breast cancer outpatients who practice yoga may have lower levels of stress, anxiety and depression than those who don’t practice yoga.

Culos-Reed et al., (2006) found that a 7 week yoga program significantly improved quality of life for cancer survivors. The researchers also observed significant improvement in emotional function among the study’s 20 yoga practicing participants.

39 lymphoma patients indicate that weekly yoga sessions may help reduce sleep disturbance, improve sleep quality, lengthen sleep duration and reduce the use of sleep medications (Cohen et al., 2004).
Women diagnosed with breast cancer within the past 5 years were given 8 day yoga based stress reduction course that includes yoganic breathing techniques known as Sudarshana Kriya Yoga (SKY) to explore their psychological and spiritual well-being. Demographic and medical history variables were assessed at the time of recruitment, QOL, spiritual well-being, perceived stress, and positive states were assessed two weeks prior to the beginning of the program. In depth semi-structured interviews were conducted with a sub-sample of 12 women following the 5 week maintenance period. The results demonstrated a significant improvement in scores of all measurements after the 8 day Art of Living course and after the 5 weeks maintenance period. Qualitative results demonstrated that the breast cancer experience was associated with distress and challenges as well as growth and transformation. Qualitative themes indicated that participation in art of living program was associated with enhanced sense of spirituality, experiences of self-exploration, self-transcendence and psycho spiritual transformation. These pilot study represent a preliminary investigation of the relationship between mind-body-spirit, yoga based practices, and psycho spiritual wellbeing of women with breast cancer (Warner, 2007).

EXERCISE

Exercise and psychological distress among cardiovascular diseases

Physical inactivity contributes to as many as 250,000 premature deaths per year. The objective was to test a trans-disciplinary model of the ways in which genetic variants, physiological factors, and psychological factors are thought to influence exercise with 64 healthy, regular exercisers. In a within-subjects design, psychological and physiological responses to
exercise were compared with responses to a sedentary activity. Bryan (2007) measured affective state, perceived exertion, heart rate, and temperature change in response to moderate exercise versus sedentary activity. They also quantified genotypes on a single nucleotide polymorphism in the brain-derived neurotropic factor (BDNF) gene. The data show a relation between increases in positive affective states and acute exercise behaviour, as opposed to a sedentary control. The BDNF gene moderated the effect of exercise on mood, heart rate, and perceived exertion. Physiological factors were, in turn, related to mood response, and mood response was a significant correlate of motivation to exercise in the future and of current exercise behaviour.

Regular physical activity of moderate intensity, such as brisk walking, reduces the risk of cardiovascular disease and mortality in women. The benefits of more vigorous exercise are not clear, but the apparent lack of a dose-response relationship between exercise intensity and cardiovascular benefit may be the result of the design of many epidemiologic and interventional studies. Studies examining the benefits of greater cardio-respiratory fitness for women are limited, but the data suggest that they are similar to that of men. Women may require greater caloric expenditure than men for weight reduction, but this issue may be confounded by other variables such as caloric intake and spontaneous physical activity. The risk of cardiovascular disease associated with type 2 diabetes is much greater in women than in men. Regular physical activity and greater cardiorespiratory fitness are associated with a lower incidence and prevalence of type 2 diabetes in women. Greater cardiorespiratory fitness has also been found to be protective of the metabolic syndrome, but the benefit of physical activity is unclear. Limited evidence suggests that moderate-intensity activities can lower systolic blood pressure in women.
There is a pressing need for more research into the health benefits of regular physical activity in women (Robert Zoeller, 2008).

Overweight or obesity is considered as a risk factor of cardiovascular disease (Rajmohan et al., 2000). Factors that may help to explain the lower BMI among vegetarians are differences in macro nutrient content, (lower protein, fat and animal fat intake) higher fiber consumption, decreased alcohol intake and greater consumption of vegetables.

A large and growing body of epidemiological evidence strongly suggests an association with lower prevalence and / or incidence of depression and anxiety. A number of physiological mechanisms have been proposed as potential links between these psychological conditions and CVD. This review specifically discusses 3 of these proposed mechanisms:

   (1) hypertension and vascular functions,
   (2) autonomic nervous system function, and
   (3) platelet activity and coagulation.

The impact of physical activity on these proposed mechanisms is also discussed (Robert Zoeller Jr, 2007).

People with depression are 2 to 4 times more likely to develop cardiovascular disease (CVD) than those without a history of the illness. In those with diagnosed coronary heart disease (CAD), depression is associated with a significantly increased risk of death or coronary event. The association between anxiety and CAD has not been studied as extensively, but, in general, increased anxiety is positively associated with the risk or CAD and mortality (Robert Zoeller Jr, 2007).
A number of studies suggest that depression and anxiety increase the risk for hypertension. In a cohort of 3343 young adults, depressive symptoms were predictive of the incidence of hypertension, especially in blacks, over a 5 year follow-up period. The incidence of hypertension over a 7-16 year follow-up period was positively associated with increased levels of anxiety and depression in both blacks and whites. Young blacks with depression were at especially high risk. Finally anxiety levels were predictive of subsequent hypertension incidence in middle-aged men but not women in the Framingham study (Robert Zoeller Jr, 2007).

Oguma et al., (2004) conducted a review and quantify the dose–response relationship of physical activity (PA) in initially healthy women on cardiovascular disease (CVD) outcomes, especially coronary heart disease (CHD) and stroke, and to assess the minimum amount of PA to reduce CVD risk. When studies were combined according to relative PA levels, the RRs showed a dose–response relationship for CHD, stroke and for overall CVD. When studies were combined by absolute walking amount, even 1 hour/week walk was associated with reduced risk of CVD outcome. Physical activity was associated with reduced risk of CVD among women in a dose–response fashion. Inactive women would benefit by even slightly increasing their PA (e.g., walking 1 hour per week or possibly less) and even more from additional PA.

**Exercise and cancer**

The evidence that exercise may play an effective role against cancer is accumulating fast. Regular exercise has been associated with a decrease in the risk of colorectal, breast, and lung cancers (Blair, Kohl, 1989).
For women, a history of moderate, recreational exercise is associated with a reduced risk of breast, uterine, cervical, and ovarian cancers, (Sternfeld, 1992) although not all studies have shown this effect (Levi, 1993). Findings from a 1993 study suggest that women engaged in moderate or high levels of physical activity may have a reduced risk of endometrial cancer; women engaged in the lowest level of physical activity had four times greater risk of cancer (McTiernan, Ulrich, 1998).

Kathleen Wolin (2007) assessed the relation between physical activity and risk of colon cancer in 79,295 women aged 40–65 who were free of cancer, ulcerative colitis and Crohn’s disease and who reported their leisure-time physical activity in 1986; 547 cases were identified through 2002. Women who expended more than 21.5 metabolic equivalent hr/week of physical activity had a relative risk (RR) of colon cancer of 0.77 (95% CI 0.58–1.01), compared to women who expended <2 metabolic equivalent hr/week. The association was stronger for distal than proximal tumours. Among women whose only reported activity was walking, there was a decreased risk of colon cancer in women walking 1–1.9 hr/week (RR = 0.69, 95% CI 0.47–1.03) compared to those who did not walk. Results were similar for increased amounts of walking, but there was no evidence of a dose response relation. Among women who participated in moderate or vigorous activity, increasing hours of activity were also associated with a decreased risk of colon cancer ($p$ for trend = 0.01); women exercising >4 hr/week had a 40% lower risk of colon cancer than those exercising <1 hr/week (RR = 0.56, 95%CI 0.33–0.94). Long-term physical activity was not associated with risk of colon cancer, but the number of cases was small. A significant inverse association exists between physical activity, including that of moderate intensity, such as walking, and risk of colon cancer in women that is more pronounced for distal tumours.
Adonina Tardon et al., (2005) have evaluated the relationship between physical activity and lung cancer. They conducted a meta-analysis of all relevant reports published from 1966 through October 2003. Adjusted odds ratios (ORs) from the original studies were pooled by the inverse of their variance, and all pooled estimates were accompanied by an assessment of heterogeneity across investigations. Test for linear trend across activity categories (low, moderate, high) were applied. The combined ORs were 0.87 (95% confidence interval = 0.79–0.95) for moderate leisure-time physical activity (LPA) and 0.70 (0.62–0.79) for high activity (p trend = 0.00). This inverse association occurred for both sexes, although it was somewhat stronger for women. Several studies were able to adjust for smoking, but none adjusted for possible confounding from previous malignant respiratory disease. Our simulations suggest that this condition is unlikely to entirely explain the inverse association. The findings of this meta-analysis indicate that higher levels of LPA protect against lung cancer. The inverse association is possible remains confounded by inadequately controlled smoking patterns. However on the whole, confounding seems an unlikely explanation for the findings of individual studies on non-smokers.

Pinto et al., (2003) examined the changes in distress and body image, and fitness following exercise participation among 24 women who had been diagnosed with breast cancer within the previous 3 years. The women were randomly assigned to participate in a 12-week supervised aerobic exercise program in a hospital setting or a wait-list control group. Assessments of distress and body image were conducted at pre- and post-treatment. Data showed that the women in the exercise group improved significantly in body image (Physical Condition and Weight Concerns subscales) vs. control group participants at post-treatment. Reductions in distress were also noted in the exercise group, but these were non-
significant. At post-treatment, there were modest improvements in fitness in the exercise group.

Inger Thune et al., (1997) identified greater leisure-time activity was associated with a reduced risk of breast cancer, after adjustments for age, body-mass index, height, parity, and county of residence among women who exercised regularly, as compared with sedentary women. In regularly exercising women, the reduction in risk was greater in premenopausal women than in postmenopausal women, and greater in younger women than in older women. In stratified analyses the risk of breast cancer was lowest in lean women (body-mass index, < 22.8) who exercised at least four hours per week. The risk was also reduced with higher levels of activity at work, and again there was a more pronounced effect among premenopausal than postmenopausal women. Physical activity during leisure time and at work is associated with a reduced risk of breast cancer.

SPIRITUALITY/ RELIGION

Spirituality/ religion and cardiovascular diseases

Powell, Shahabi & Thoresen (2003) found that religion or spirituality serve to protect against cardiovascular disease.

Koenig, McCullough, & Larson (2001) found that psychosocial-behavioural interventions incorporating a religious/spiritual element were found to have a beneficial impact on cardiovascular health status. They found that those who were more religious tended to have lower blood pressure, especially diastolic blood pressure. As with heart disease
interventions, most spiritual/religious interventions for blood pressure were successful in lowering it. While fewer studies have been conducted on religion and stroke, a trend appeared suggesting that greater attendance at religious services predicted decreased chance of suffering stroke.

Seeman, Dubin, & Seeman (2003) point toward a positive association between prayer or meditation and improved health functioning, including cardiovascular functioning.

In a study looking at the utilization of complementary and alternative therapies in cardiac patients over the age of 35, spiritual healing was one of many complementary practices sought by participants (Ai & Bolling, 2002). Of 225 patients assessed prior to cardiac surgery, almost 81% had used some type of complementary technique. Slightly less than a quarter of the participants reported having tried spiritual healing. Attempts to use complementary and alternative therapies were found to be higher in those who had more years of education, a better functioning status, fewer non-cardiac chronic conditions, and were more likely to have been former smokers and have had the specific cardiac condition of congestive heart failure.

In a group of 45 patients with diseases (including those with cancer, cardiac, pulmonary, and liver/kidney diagnoses), spiritual well-being, as measured by The Modified City of Hope Questionnaire (MCHQ), was a significant predictor of death distress, along with physician communication and physical symptom severity (Chibnall, Videen, Duckro, & Miller, 2002). Thus, greater death distress was experienced by those with greater physical symptom severity, poorer communication with physician, and poorer
spiritual well-being. Higher scores on depression were also moderately predictive of death distress in this group.

Focusing on the spiritual in those who have suffered a stroke, Kyllo (1996) noted that the spiritual realm may be the only area of a person’s life in which he or she can maintain independence. Unfortunately, the spiritual component in most stroke patient’s lives is often neglected by others in the immediacy to help the physical component of the person. Stroke can leave individuals feeling guilty, angry, useless, and hopeless, but spirituality can provide comfort to these individuals, providing what Kyllo regarded as four basic needs: love, purpose and value, power and control, and belongingness.

Embedded in a larger study, the use of prayer and meditation was predicted by a number of factors in a sample of 879 Canadian older adults (Wister, Chittenden, McCoy, Wilson, Allen, & Wong, 2002). Using data from the 1995-1996 North Shore Self-Care Study, the use of alternative medicine and techniques to aid in the coping of three chronic illnesses—arthritis, heart disease, and hypertension—were investigated. Predictor variables were predisposing factors (e.g., gender, age, health beliefs), need factors (e.g., pain, activity limitations, illness duration), and enabling factors (e.g., income, social support, self-efficacy). Approximately 29% of the sample reported using prayer or meditation as a way to cope with their chronic illness. No significant differences were found between participants with arthritis and participants with either of the cardiovascular conditions in terms of their proclivity to engage in prayer or meditation. Results of logistic regression analysis identified younger age, female gender, non-married status as predisposing characteristics associated with practicing prayer and meditation to cope with health conditions. Perception of greater
severity of illness and longer illness duration were need factors that increased the likelihood of coping with prayer or meditation. Also, prayer or meditation was more likely to be practiced by individuals who had both a number of confidants in their social network as well as support from another person who has the same illness.

In a retrospective study, Ai, Bolling, and Peterson (2000) examined the role of private prayer in 151 individuals who had received coronary artery bypass graft (CABG) surgery. Structural equation modeling depicted those practicing prayer as having less psychological distress at 12-month follow-up, even when estimated distress at 1-month and distress at 12-month were controlled in analysis.

Prayer’s relationship with optimism was considered in a study using a similar sample (Ai, Peterson, Bolling, & Koenig, 2002). Optimism, importance of private prayer, intent to use prayer to cope with surgery, faith in the efficacy of prayer, prayer content, religious affiliation, and religiousness were measured along with mental and physical health status in a sample of 246 patients soon to undergo cardiac surgical procedures. Older participants, higher socioeconomic status, and those who were less depressed and anxious were more likely to be optimistic. Private prayer, excluding prayer content, also significantly predicted optimism, although religious affiliation and religiousness did not. Notable from this study is that traditional measures of religion (i.e., affiliation and religiousness), at least as measured in this study, were not associated with the positive and health-beneficial characteristic of optimism, whereas the debatably more sensitive measure of private prayer was.
Religious/spiritual practices also have been shown to have a direct effect on cardiovascular functioning. Recitation of both rosary prayer and yoga mantras were found to decrease respiration, systolic blood pressure, diastolic blood pressure, and transcranial blood flow (Bernardi et al., 2001).

A fair number of studies have found associations between decreases in cardiovascular markers of disease and the practice of prayer and meditation. A group of nuns (assumed to live contemplative and prayerful lives) were followed longitudinally for 30 years and were found to have fairly stable blood pressure over time whereas increases in blood pressure were found for a control group (Timio, 1997). Mindfulness meditation has also been found in a controlled study to decrease anxiety in women diagnosed with heart disease (Tacon, McComb, Caldera, & Randolph, 2003).

**Spirituality/ religion and cancer**

A handful of studies have recently provided support for the hypothesis that religiosity and spirituality may affect health via the immune system. The current study sought to expand this literature base by exploring the relationship among spirituality, religiosity and immune functioning in a group of men and women with advanced cancer. In conclusion, although no association between religiousity/ spirituality and immune functioning was identified among the whole sample, correlations in the moderate range were identified among spirituality and IL-6 religiosity and IL-6 among those who had blood drawn close to interview completion, thus indicating that higher levels of spirituality and religiousity and likely linked to better immune functioning (Jacobson et al., 2005).
58 women diagnosed with early stage breast cancer undergoing chemotherapy completed a survey assessing QOL and spiritual WB at two time points, shortly after their first oncologist’s visit and one month following completion of chemotherapy. Spiritual WB is related to physical and emotional WB. Encouraging individuals to finding meaning and peace in their life as well as exploring sources of comfort such as faith may lessen the suffering both physical and emotional that can accompany a cancer diagnosis (Rademacher, Jennifer, 2007).

Summers et al., (2007) examined how body image changes inherent in cancer and its treatment related to spiritual development, and to determine if body dissatisfaction had any relationship to spirituality. Results indicated that spiritual beliefs and spiritual coping activities helped the patients to cope with their cancer. Spirituality was significantly greater for those no longer receiving treatment compared to those undergoing surgery, chemotherapy, radiation, and/or alternative treatment. Furthermore, significant differences in spirituality were found among religious groups. Changes in body appearance and body functioning were related to body dissatisfaction, which demonstrated an inverse correlation with overall spirituality. In addition, as the number of treatment side effects increased so did levels of body dissatisfaction.

Guji and Makiko (2005) explore the experience of recovering from a diagnosis of terminal - cancer. The results of this study indicate that there are 11 essential themes in the phenomenon of surviving terminal cancer: Moment of Diagnosis, Determination to Heal, Resilience and positive Attitude. Sense of Control Vs. Letting Go of control, Spirituality and Faith, Coping with Negative Emotions, Conflicts with conventional Medical Systems, Support Systems, Sense of Responsibility, Positive
Transformations and personal Growth, and Redefined Meaning and Purpose of Life. The findings indicate the profound and dynamic nature of the healing mechanism of the human body that is deeply affected by psychological and environmental factors. The experiences of six subjects were transformational in nature, each refined the meaning and purpose of their lives as a result of a traumatic event. Each subject made a conscious and uncompromising choice to live his or her life to its fullest. The findings suggest that one could pursue higher levels of health and wellness beyond one’s physical body, which would continue to evolve in mental, spiritual, and interpersonal levels.

**PSYCHOSOCIAL INTERVENTIONS**

**Psychosocial interventions and cardiovascular disease**

Dutton et al., (2007) examined the effect of a psychosocial group intervention on the coping of cardiac rehabilitation patients. Results found a significant decrease in psychologically distressing symptoms of interpersonal sensitivity, depressive symptoms, symptoms of hostility and global psychopathology. A significant difference was found in the confrontive style of coping. Qualitatively, 2 themes arouse among participants, that of benefiting from meeting with other individuals who had suffered a cardial trauma and increase in awareness, understanding and knowledge.

Dean Ornish (2002) published numerous papers throughout the 1980s and 1990s, demonstrating that lifestyle changes, including low-fat diet, exercise, yoga, and group support, can impact the course of, and in many cases even reverse, severe coronary artery disease. In his recent book
Love and Survival: The Scientific Basis for the Healing Power of Intimacy, Ornish notes that scientists and practitioners have long believed that the benefits of his program are due to diet and exercise changes. They have often overlooked the evidence that stress management techniques are as strongly correlated with changes in coronary artery disease as is adherence to diet. He goes on to note that as important as changes are in cardiac positron emission tomographic scans and arteriograms, there are even more important outcomes that patients and their families experience that are more difficult to quantify. These include: rediscovering inner sources of peace, joy, and well-being, learning how to communicate in ways that enhance intimacy with loved ones, creating a healthy community of friends and family, developing more compassion and empathy for themselves and others, and directly experiencing the transcendent interconnectedness of life. There is a growing body of empirical evidence that "healing the heart" requires care of the whole person -- the body, mind, and spirit. To effectively achieve this requires tapping into a broad array of healing options, including the best of high-technology biomedical care as well as complementary and alternative care options.

**Psychosocial interventions and cancer**

Wells Kurrie (2007) investigated the effects of a cognitive-behavioural stress management (CBSM) intervention on anxiety and natural killer (NK) cell function in 85 women recently diagnosed with stage 0-III breast cancer. 40 women participated in a 10 week closed group. CBSM intervention and 45 women were offered a 1-day didactic seminar summarizing the content of the full-length intervention. All women were assessed at baseline (within 2-8 weeks of surgery and prior to beginning adjuvant treatment) and at follow-ups that were 6 and 12 months from
Participants in the intervention experienced a significant trend towards continued reductions in anxiety on 2 of the 5 measures (Hamilton anxiety score and IES avoidance scores) compared to controls over the course of 1 year. No intervention effects emerged in NK function. Results are discussed in the light of the pattern of CBSN effects on physical and behavioural symptoms of anxiety and distress as compared to cognitive and affective symptoms of anxiety and distress. Additionally, the need for research that examines the effects of various components of stress management interventions on specific immune and neuroendocrine parameters is addressed.

Penedo (2003) evaluated relations among optimism, perceived stress management skills (PSMS), and positive mood in 46 men who had surgical treatment for localized prostate cancer. The study found that optimism, PSMS, and positive mood scores were positively correlated. Positive mood was unrelated to demographic and disease-related control variables. In a hierarchical regression model controlling for PSMS, the relationship between optimism and positive mood became non significant, whereas PSMS remained a correlate of positive mood. Results suggest that the relationship between optimism and positive mood may be mediated by belief in being able to use stress management techniques effectively.

**SUMMARY OF THE LITERATURE REVIEW**

An exhaustive review of literature has been done and is summarized here. The studies reviewed here provide adequate information about relevant researches done in this area. The studies regarding mind-body relationship, psychosomatic disorders, lifestyle disorders and its classifications, cardiovascular disease and cancer, classification, its causes,
the psychological factors associated with them and the intervention programs/ complimentary alternative therapies to reduce the psychological distress caused by them are reviewed. Several studies revealed the association of various psychological and socio-demographic aspects such as certain types of personality, psychological distress, lack of social support, low socioeconomic status, and even gender leads to the incidence and prognosis of cardiac disorders and cancer. To sum up, the studies reported in this chapter provide adequate theoretical and scientific background for the present investigation.

The detailed methodology of the study is presented in the following chapter.