CHAPTER II
REVIEW OF LITERATURE

A review of literature is an essential aspect of a scientific research. It provides a basis for future investigations. It justifies the need for replication, throws light on the feasibility of the study, indicates constraints of data collection and helps to relate the findings from one study to another with a view to establish a comprehensive body of scientific knowledge in a professional discipline.

This chapter consists of two sections:

Section A: Review of related literature

Section B: Conceptual framework

Section A : Review of related literature

2.1.1 Prevalence and factors contributing to stress and anxiety during pregnancy

2.1.2 Effects of maternal stress and anxiety on pregnancy

2.1.3 Effects of maternal stress and anxiety on labour outcomes

2.1.4 Effects of stress and anxiety on fetus and newborn

2.1.5 Management of stress and anxiety during pregnancy

2.1.6. Progressive muscle relaxation for stress and anxiety

2.2 Section B : Conceptual frame work

Sister. Callista Roy's adaptation model was adopted for this study.

2.1.1 Prevalence and factors contributing to stress and anxiety during pregnancy
Barbara Figueiredo and Ana Conde (2011) investigated high-anxiety and depression in women and men from early pregnancy to 3-months postpartum among 260 Portuguese couples by using the State-Anxiety Inventory (STAI-S) and the Edinburgh Post-Natal Depression Scale (EPDS) at the first, second, and third pregnancy trimesters, childbirth, and 3-months postpartum. Rates for high-anxiety (STAI-S ≥ 45) in women (13.1%; 12.2%; 18.2%; 18.6%; 4.7%) and men (10.1%; 8.0%, 7.8%; 8.5%; 4.4%) and for depression (EPDS ≥ 10) in women (20.0%, 19.6%, 17.4%, 17.6%; 11.1%) and men (11.3%; 6.6%; 5.5%; 7.5%; 7.2%) were high. Rates for depression were higher than rates for high-anxiety only in women during early pregnancy and the postpartum, but not at the third pregnancy trimester and childbirth. Rates for high-anxiety and depression were higher in women than in men during pregnancy/childbirth, but not at 3-months postpartum. Rates for high-anxiety but not rates for depression were higher during pregnancy/childbirth compared to 3-months postpartum and only in women. Considering that 15.9% of the parents-to-be were highly anxious and/or depressed during pregnancy-comparing to 9.3% at 3-months postpartum-particular attention should be drawn to both women's and men's mental health early in pregnancy.

Gun-Mette, Rosand., Kari Slinning and Malin Eberhard-Gran (2011) identified maternal emotional distress during pregnancy and risk factors for the distress among 51,558 pregnant women in Norway. Mothers were assessed for emotional distress, relationship satisfaction, and other risk factors. Result revealed that dissatisfaction was the strongest predictor of maternal emotional distress (b = 0.25). Other predictors were dissatisfaction at work (b = 0.11), somatic disease (b = 0.11), work related stress (b = 0.10) and maternal alcohol problems in the
preceding year ($b = 0.09$). Relationship satisfaction appeared to buffer the effects of frequent moving, somatic disease, maternal smoking, family income, irregular working hours, dissatisfaction at work, work stress, and mother’s sick leave ($P < 0.05$). The study concluded that dissatisfaction with the partner’s relationship was significant predictor of maternal emotional distress in pregnancy. A good partner relationship can have a protective effect against some stressors.

Nasreen, Kabir, Forsell and Edhborg (2011) estimated the prevalence of depressive (ADS) and anxiety symptoms (AAS) and explored the associated factors among 720 rural Bangladeshi pregnant women. The validated Bangla version of the Edinburgh Postnatal Depression Scale was used to measure ADS, and a trait anxiety inventory to assess general anxiety symptoms. Background information was collected using a structured questionnaire at the respondents' homes. Prevalence of ADS was 18% and AAS 29%. Women's literacy (OR 0.59, 95% CI 0.37-0.95), poor partner relationship (OR 2.23, 95% CI 3.37-3.62), forced sex (OR 1.95, 95% CI 1.01-3.75), physical violence by spouse (OR 1.69, 95% CI 1.02-2.80), and previous depression (OR 4.62 95% CI 2.72-7.85) were found to be associated with ADS. The associated factors of AAS were illiteracy, poor household economy, lack of practical support, physical partner violence, violence during pregnancy, and interaction between poor household economy and poor partner relationship. Research concluded that antenatal need to screen for depression and anxiety during antenatal care. Policies aimed at encouraging practical support during pregnancy, reducing gender-based violence, supporting women with poor partner relationships, and identifying previous depression may ameliorate the potentially harmful consequences of antepartum depression and anxiety for the women and their family, particularly children.
Ghosh, Michelle, Christine Schetter, Christina Lombard and Beate (2010) assessed the influence of support during pregnancy on preterm birth risk and amelioration of the effects of chronic stress, life event stress, or pregnancy anxiety in pregnant women in 1,027 singleton preterm births and 1,282 full-term normal weight controls at Los Angeles. Adjusted odds of preterm birth decreased with better support (OR 0.73 [95%CI 0.52, 1.01]). Chronic stress (OR 1.46 [95%CI 1.11, 1.92]), low confidence of a normal birth (OR 1.57 [95% CI 1.17, 2.12]), and fearing for the baby’s health (OR 1.67 [95%CI 1.30, 2.14]) increased preterm birth risk, but life events showed no association. Data suggested that paternal support may modify the effect of chronic stress on the risk of preterm birth, among mothers lacking support, those with moderate to high stress were at increased odds of delivering preterm (OR 2.15 [95%CI 0.92, 5.03]), but women with greater support had no increased risk with moderate-to-high chronic stress (OR 1.13 [95%CI 0.94, 1.35]). Paternal support may moderate the effects of chronic stress on the risk of preterm delivery.

Parcells (2010) investigated the relationship between maternal psychosocial and biochemical profiles during the antepartum period. Participants were recruited from prenatal registration at a southeastern USA. The sample consisted of 59 pregnant women (mean age = 22 years). Structured clinical interviews and maternal self-report were utilized to assess maternal psychosocial distress at mid- (26-28 weeks) and late (32-34 weeks) gestation. Salivary cortisol levels served as an objective stress measure. The result revealed that high incidences of maternal depression, anxiety and stress provide evidence of the need for nurses to closely monitor psychosocial and biochemical profiles of all women to thwart the negative effects on the developing human foetus.
Sarah Woods Melville, Guo, Fan and Gavin (2010) identified factors associated with high antenatal psychosocial stress and the course of psychosocial stress during pregnancy among 1522 women by the Prenatal Psychosocial Profile stress scale at Washington. The majority of participants reported antenatal psychosocial stress (78% low-moderate, 6% high). Depression (odds ratios [OR], 9.6; 95% confidence interval [CI], 5.5–17.0), panic disorder (OR, 6.8; 95% CI, 2.9–16.2), drug use (OR, 3.8; 95% CI, 1.2–12.5), domestic violence (OR, 3.3; 95% CI, 1.4–8.3), and having ≥2 medical comorbidities (OR, 3.1; 95% CI, 1.8–5.5) were significantly associated with high psychosocial stress. The study concluded that antenatal psychosocial stress is common and high levels are associated with maternal factors known to contribute to poor pregnancy outcomes.

Bodecs, Horvath, Kovacs, Diffellne Nemeth and Sandor (2009) estimated prevalence of anxiety and depression among pregnant women at Hungary 17.9% (95%CI: 13.0-21.5%) of pregnant women showed signs of depression, 1.0 % of whom had severe depression. 14.6% of them showed signs of anxiety (95%CI: 10.7-18.6%), moreover, 4.2 % of them had explicit angst. Depression and anxiety proved to be significantly more prevalent among unskilled workers, those with low incomes and unemployed women. Depression turned out to be significantly more prevalent among women under the age of 18, and those living in common-law relationships.

Faisal-Cury, Menezes, Araya and Zugaib (2009) estimated the prevalence of common mental disorders (CMD) and factors associated with these disorders among pregnant women of low socio-economic status (SES) in Brazil among 831 women in their 20th to 30th weeks of pregnancy for CMD was assessed with the Clinical Interview Schedule-Revised. Crude and adjusted
prevalence ratios and 95% CI were calculated to examine the association between CMD and exposure variables. The prevalence of CMD was 20.2% (95% CI 17.5 to 23.0). Age at current pregnancy and at first delivery, current obstetric complications, not having friends in the community, living in a crowded household, lower occupational status and history of previous psychiatric treatment were all independently associated with increased prevalence of CMD. CMD is highly prevalent among pregnant women of low SES seen in primary care settings. A combination of distal and proximal psychosocial factors increase the risk for CMD. A primary health care professionals need to be aware of how common CMD in such settings and properly trained to deal with CMD during pregnancy.

Karmaliani, Asad, Bann, Moss, Mcclure, Pasha, Wright, and Goldenberg (2009) determined the prevalence of anxiety and depression and evaluated associated factors, including domestic violence, among pregnant women in an urban community in Hyderabad at Pakistan among 1,368 women at 20-26 weeks of gestation. The result revealed that eighteen percent of the women were anxious and/or depressed. Psychological distress was associated with husband unemployment (p = 0.032), lower household wealth (p = 0.027), having 10 or more years of formal education (p = 0.002), a first (p = 0.002) and an unwanted pregnancy (p<0.001). The strongest factors associated with depression/anxiety were physical/sexual and verbal abuse; 42% of women who were physically and/or sexually abused and 23% of those with verbal abuse had depression/anxiety compared to 8% of those who were not abused. The study concluded that anxiety and depression commonly occur during pregnancy in Pakistani women; rates are highest in women experiencing sexual/physical as well as verbal abuse, but they are also
increased among women with unemployed spouses and those with lower household wealth. These results suggest that developing a screening and treatment programme for domestic violence and depression/anxiety during pregnancy may improve the mental health status of pregnant Pakistani women.

Surapol Wingwontham Thitadilok, and Singhakant (2008) studied the prevalence of mental health problem during first-half pregnancy at Bangkok among 255 singleton pregnant women < 20 weeks of gestation using Thai GHQ-30 (mental health problem screening tool) and frequent psychosocial stressor forms. The prevalence of mental health problem was 17.3%. Factors independently associated with mental health problem included worrying about health, stress of taking care of other family members and financial problem with adjusted OR 3.5 (95% CI 1.16, 10.74), 3.8 (95% CI 1.80, 7.89) and 3.2 (95% CI 1.34, 7.53) respectively. Researcher suggested that screening of mental health problem should be included in antenatal care service especially in the risk group.

Faisal Cury and Rossi Menezesl (2007) identified the prevalence and risk factors for antenatal anxiety (AA) and antenatal depression (AD) among 432 women attending a private clinic in the city of Osasco, Sao Paulo using the Spielberger state-trait anxiety inventory (STAI), Beck depression inventory (BDI), and a questionnaire for socio-demographic and obstetric data. With the inclusion criteria of pregnant women with no past or present history of depression, psychiatric treatment, alcohol or drug abuse and no clinical and obstetric complications. The prevalence of AA, according to STAI, and AD, according to Beck Inventory, were estimated with 95% confidence intervals (95% CI). Odds ratios and 95% CI were used to examine the association between AA and AD and exposures variables. The findings revealed that the prevalence of AA, state and
trait were 59.5 (95 CI%: 54.8:64.1%) and 45.3% (95% CI: 40.6:50.0), respectively. The prevalence of AD was 19.6 (95% CI:15.9:23.4). In the multivariate analysis, AA-trait (OR: 5.26; 95% CI 2.17:12.5, p < 0.001), AA-state (OR: 2.27; 95% CI 1.08:4.76, p= 0.02) and AD (OR: 2.43; 95% CI 1.40:4.34, p = 0.002) were associated with lower women’s educational level. AA-trait (OR: 3.43; 95% CI 1.68:7.00, p = 0.001), AA-state (OR: 2.22; CI 95% 1.09:4.53, p = 0.02) and AD (OR: 2.82; CI 95% 1.35:5.97, p = 0.005) were also associated with not being married. AA-trait was associated with lower women’s income (OR: 2.22; 95% CI 0.98:5.26, p= 0.05) and not being white (OR: 1.7; 95% CI 1.00:2.91, p = 0.04), while AD was associated with lower couple’s income (OR: 2.43; 95% CI 1.40:4.34, p = 0.001) and greater number of previous abortions (OR: 2.21; 95% CI 1.23:3.97, p = 0.009).

Lee, Lam Sze Mun, Lau Chong , Chui and Fong . (2007) estimated the prevalence and course of antenatal anxiety and depression across four stages of pregnancy: first trimester, second trimester, third trimester, and 6 weeks postpartum, risk factors at each stage, and the relationship between antenatal anxiety and depression and postpartum depression among 357 pregnant women at Hongkong by using the Hospital Anxiety and Depression Scale and postpartum depression with the Edinburgh Postnatal Depression Scale. Results revealed that more than one half (54%) and more than one third (37.1%) of the women had antenatal anxiety and depressive symptoms, respectively, in at least one antenatal assessment. Anxiety was more prevalent than depression at all stages. A mixed-effects model showed that both conditions had a nonlinear changing course (P<.05 for both), with both being more prevalent and severe in the first and third trimesters. Risk factors were slightly different at different stages. Both antenatal
anxiety (adjusted odds ratio [OR] 2.66, \( P = .004 \) in the first trimester; adjusted OR 3.65, \( P < .001 \) in the second trimester; adjusted OR 3.84, \( P < .001 \) in the third trimester) and depression (adjusted OR 4.16, \( P < .001 \) in the first trimester; adjusted OR 3.35, \( P = .001 \) in the second trimester; adjusted OR 2.67, \( P = .009 \) in the third trimester) increased the risk of postpartum depression. The research concluded that antenatal anxiety and depression are prevalent and serious problems with changing courses. Continuous assessment over the course of pregnancy is warranted. Identifying and treating these problems is important in preventing postpartum depression.

Adewuya, Ola, Aloba, and Mapayi (2006) investigated the rate and type of anxiety disorders among Nigerian women in late pregnancy. Women in late pregnancy (n=4172) and a non-pregnant control group were assessed for DSM-IV anxiety disorders. The rate of any anxiety disorder in the pregnant women was 39.0\% compared with 16.3\% in the non-pregnant population (\( p < 0.001 \)). Although all the anxiety disorders were more common, only the rate of social anxiety disorder was significantly higher among the pregnant than non-pregnant population. Correlation of anxiety disorder in the pregnant population included age less than 25 years (OR 4.62, 95\% CI 2.39–8.92), primiparity (OR 3.90, 95\% CI 2.00–7.59) and presence of medical conditions (OR 3.60, 95\% CI 1.28–10.12).

Schommer Hellhammer and, Kirschbaum (2003) investigated endocrine and autonomic stress responses after repeated psychosocial stress and detect possible subgroups with regard to individual habituation patterns in the hypothalamus-pituitary-adrenal (HPA) axis and monitor their respective sympathetic stress responses, among sixty-five healthy subjects (19-45 years), 38 men and 27 women, were exposed to the Trier Social Stress Test (TSST) three
times with a 4-week interval between stress sessions. Adrenocorticotropic hormone (ACTH), plasma cortisol, salivary cortisol, epinephrine, norepinephrine, and heart rates were measures repeatedly before and after each stress exposure. All endocrine measures as well as heart rates increased significantly after each of the three stress sessions (F values >16.00, all p values <.01). Although salivary free cortisol, total plasma cortisol, ACTH, and heart rate stress responses showed a significant decrease across the three stress sessions (all F values > 5.8, p <.01), no such decrease could be observed for the levels of norepinephrine and epinephrine. A cluster analysis performed on the salivary free cortisol responses to all three stress sessions revealed two response groups consisting of 30 so-called "high responders" and 35 "low responders." The high responders also showed larger ACTH and total plasma cortisol responses compared with the low responders (all F values > 10.00, p <.01). No such differences between high and low responders could be observed with regard to catecholamine and heart rate responses. Data concluded that habituation to psychosocial stress seems to be specific for a given response system. Although HPA responses quickly habituate, the sympathetic nervous system shows rather uniform activation patterns with repeated exposure to psychosocial challenge.

Da Costa, Larouche, Ditsa, and Brender (1999) studied hassles, pregnancy-specific stress, and state anxiety during pregnancy and identified predictors of each stress dimension among 161 pregnant women by using Hassles Scale, the Pregnancy-Specific Stress Questionnaire (PEQ), and the state-anxiety scale (STAI-state) monthly, beginning from the third month of pregnancy. Hassles were found to be stable throughout the pregnancy. Women reported significantly higher pregnancy-specific stress in the first and third trimester of
pregnancy, whereas state anxiety increased in the third trimester compared with the first and second trimesters. Poorer marital adjustment predicted higher hassles during pregnancy and higher PEQ and STAI-state in the third trimester. Women who reported that the pregnancy would have a negative impact on their career scored higher on Hassles during pregnancy and higher on the PEQ in the third trimester. Occurrence of a gestational complication during pregnancy was related to higher pregnancy-specific stress in the third trimester. Younger women also reported higher PEQ results in the third trimester. The data provided support for a multidimensional conceptualization of stress during pregnancy.

Siogren (1997) assessed the reasons for anxiety about childbirth among 100 pregnant women. The result revealed that lack of trust in the obstetrical staff (73%), fear of own incompetence (65%), fear of death of mother, infant or both (55%), intolerable pain (44%) or loss of control (43%). A previous complicated delivery predisposed for fear of death (\( p < 0.001 \)). Fear of death in a previous labor was associated with this fear regarding the impending delivery (100%, 21%, \( p < 0.001 \)) and with fear of loss of control (61%, 18% \( p < 0.01 \)). 37% women had partners who admitted anxiety over the delivery. Anxiety over childbirth is related to fundamental human feelings: lack of trust, fear of female incompetence and fear of death and fear of pain.

2.1.2 Effects of maternal stress and anxiety on pregnancy

Kramer, Bowen, Stewart and Muhajarine (2013) examined the prevalence, severity, and psychosocial determinants of nausea and vomiting during early and late pregnancy (NVP) among 648 Canadian women by using Nausea and Vomiting in Pregnancy Instrument (NVPI), the Cambridge Worry Scale (CWS),
and the Edinburgh Postnatal Depression Scale (EPDS). Demographic, maternal, obstetrical, psychological, and behavioral variables related to NVP were also examined. Odds ratios and 95% confidence intervals were calculated for all risk factors investigated using multiple logistic regression, controlling for potential confounders. The result revealed that the prevalence of NVP was 63.3% (n = 551) at Time 1 (early pregnancy) and 45.4% (n = 575) at Time 2 (late pregnancy). Severity of symptoms was associated with earlier gestation, antiemetic medication use, employment status, and symptoms of major depression. Maternal smoking and having the support of three or more persons were protective for NVP.

Bindt Appiah-Poku, Te Bonle, Schoppen, Feldt, Barkmann and Koffi (2012) studied the influence of antepartum depression and anxiety on disability among 1030 Ghanaian and Ivorian from south African women in the third trimester of the pregnancy using the Patient Health Questionnaire depression module (PHQ-9), the 7-item Anxiety Scale (GAD-7), and the World Health Organisation Disability Assessment Schedule II (WHO-DAS 2.0, 12-item version). 26.6% and 32.9% of women showed depressed mood among Ghanaian and Ivorian women respectively. The generalized anxiety disorder were observed in 11.4% and 17.4% of pregnant women, respectively. Comorbidity of both conditions was common, affecting about 7.7% of Ghanaian and 12.6% of Ivorian participants. Pregnant women in both countries reported a high degree of disability regarding everyday activity limitations and participation restrictions. The study concluded that antepartum depression and anxiety were highly prevalent and contributed substantially to perceived disability.
Lydon, Dunne, Owens, Avalos, Sarma, O'Connor, Nestor and McGuire (2012) examined the psychosocial profile of 25 women with gestational diabetes mellitus (GDM) and compared them to 25 non-diabetic pregnant women. Measures administered included the Pregnancy Experiences Scale (PES), the Depression, Anxiety Stress Scale (DASS), the Problem Areas in Diabetes Scale (PAID-5) and the Perceived Social Support Scale (PSSS). The GDM group reported a significantly greater ratio of pregnancy 'hassles' to pregnancy 'uplifts'. The GDM group also had a significantly higher depression score and was twice as likely to score above the cut-off for possible depression. Elevated levels of diabetes-related distress were found in 40% of women with GDM. In addition, the GDM group reported less social support from outside the family. Study indicates that the experience of GDM appears to be associated with increased psychological distress in comparison to the experience of non-diabetic pregnant women. This may indicate the need for psychological screening in GDM and the provision of psychological support.

Schytt Hildingsson (2011) examined the prevalence of physical and emotional self-rated health (SRH) in women and men during pregnancy and after childbirth and to identify associated risk factors among 1212 pregnant women and 1105 partners recruited in gestational week 18 and follow-ups in gestational week 33, 2 months and 1 year after childbirth. In women, the prevalence of poor physical SRH increased from 20% to 37% between mid and late pregnancy and from 19% and 34% between 2 months and 1 year after the birth. Men had a more stable level of physical SRH, 17-19% during pregnancy and 2 months postpartum, but reached 31% 1 year after birth. A similar pattern was found for poor emotional SRH, where women's and men's poor emotional health reached 24% and 22%,
respectively, at 1 year. Factors associated with poor emotional or physical SRH were physical and emotional changes, fear of childbirth, parenthood stress, lack of partner support, bodily pain, low level of education, financial worries, tobacco use, and an emergency caesarean section.

Grant, McMahon and Austin (2008) examined the course of maternal anxiety across the transition to parenthood among 100 women in Sydney. Participants completed the STAI during the third trimester of pregnancy and the mini-plus was administered during pregnancy and during the seventh postnatal month to assess anxiety and depression meeting DSM-IV criteria. The study concluded that antenatal anxiety meeting diagnostic criteria and antenatal trait anxiety exceeding a cut-off score of 40 on the STAI were both found to be significant predictors of postnatal anxiety and mood disorders (p-values<.05). The findings from this study suggest that antenatal anxiety as assessed by either clinical interview or maternal self-report is an important predictor of postnatal anxiety and mood disorders.

Leeners, Wagner Kuse, Stiller and Rath (2007) investigated the correlation between emotional stress during pregnancy and the risk for hypertensive diseases in pregnancy (HDP). A self-administered questionnaire comprising obstetrical and psychosocial questions was completed by 725 patients and 880 controls matched for age, parity, nationality, and educational level. Emotional stress during pregnancy was associated with a 1.6-fold increased risk for HDP. The study found that psychosocial interventions to reduce emotional stress during pregnancy may help to decrease the risk to develop HDP.
Suzie Daniells, Grenyer, Davis, Coleman, Burgess, and Moses (2003) examined anxiety levels of women diagnosed with gestational diabetes mellitus (GDM) and to compare these with glucose-tolerant (GT) among 50 women with GDM and 50 GT women. All women completed the Mental Health Inventory (MHI-5) forms and the Speilberger State-Trait Anxiety Inventory (STAI) at the beginning of the third trimester antepartum and 6 weeks postpartum. Specific questions were also assessed using a Likert scale. The result revealed that women with GDM, compared with GT women, had a higher level of anxiety (state rather than trait) at the time of the first assessment. However, before delivery and in the postpartum period, there were no significant differences in anxiety scores between the two groups.

Smith, Crowther, Beilby and Dandeaux (2000) assessed the impact of nausea and vomiting on women in early pregnancy by interviewing, using a structured questionnaire among 593 pregnant women presenting with nausea and vomiting in the first trimester of pregnancy. The women were asked to complete the Rhodes index of nausea and vomiting and the MOS 36 Short Form Health Survey (SF-36) and symptoms of nausea and vomiting started early in pregnancy. Nausea was the most troublesome symptom experienced by women, both in its duration and intensity. Low scores for the SF-36 were found for all items, particularly physical functioning, energy and social functioning. The women described substantial effects on working, household duties and parenting activities. The study suggests nausea and vomiting in early pregnancy has a profound impact on women's general sense of well-being and day to day life activities.

2.1.3 Effects of maternal stress and anxiety on labour outcomes
Loomans, Van Dijk, Vrijkotte, Eijsden, Stronks, Gemke, and Van den Bergh (2012) identified and characterized different clusters of pregnant women, each with a distinct pattern of psychosocial stress and birth outcomes between these clusters among 7740 pregnant women. They were assessed for depressive symptoms, state anxiety, job strain, pregnancy-related anxiety and parenting stress. Result revealed that five clusters of women with distinct patterns of psychosocial stress were objectively identified. Babies born from these women in the cluster were characterized as ‘high depression and high anxiety, moderate job strain’ (12%) had a lower birth weight, and those in the ‘high depression and high anxiety, not employed’ cluster (15%) had an increased risk of pre-term birth.

Hosseini, Biglan, Larkby, Brooks, Gorin, and Day (2009) identified the relationships between trait anxiety symptoms of women during their pregnancies and birth outcomes of their offspring using a longitudinal cohort from the Maternal Health Practices and Child Development Project. The State-Trait Personality Index anxiety measure that is based on Spielberger's State-Trait Anxiety Inventory, which measured self-reported trait anxiety at two gestational assessments (fourth and seventh months, representing the first and second trimesters, respectively) and at a third assessment shortly after delivery (representing the third trimester). Demographic, social, psychological, substance use and medical factors were assessed prenatally and outcomes of the 763 live, singleton births were determined at delivery. In regression models, trait anxiety at the second and third trimesters predicted lower birth weight and shorter birth length, controlling for confounders. Anxiety reported at the third trimester predicted shortened gestational age, controlling for confounders. At the first and second trimesters, the relationship of birth weight and birth length to maternal trait anxiety was only significant for
severe anxiety. Women whose anxiety reached severe levels for at least two trimesters were significantly more likely to deliver offspring of lower birth weight and shorter birth length than those women who reported severe anxiety at none or only one of the trimesters. Offspring of women who experienced severe anxiety during all three trimesters had shorter mean gestational age than offspring of women who did not report severe anxiety at any trimester. Women who report chronic, severe trait anxiety are at the highest risk of having shorter gestations and delivering smaller babies.

Glynn, Laura, Schetter, Hobel, Sandman and Curt (2008) predicted the pattern of prenatal stress, and preterm delivery (PTD) among 415 pregnant women at 18-20 and 30-32 weeks' gestation. The outcome measures were gestational length determined by last menstrual period and confirmed by early pregnancy ultrasound. Gestational age at births were categorized as preterm (< 37 weeks) or term. Result revealed that anxiety and stress were associated with gestational length. Majority of women who delivered at term exhibited declines in stress and anxiety, those who delivered preterm exhibited increases. The elevated risk for PTD associated with an increase in stress or anxiety persisted when adjusting statistically for obstetric risk, pregnancy-related anxiety, ethnicity, parity, and prenatal life events. The pattern of prenatal stress is an important predictor of PTD, a decline in stress responses during pregnancy may help to protect mother and fetus from adverse influences associated with PTD.

Marci, Cannella, Lacey; Graham, Jennifer DeVincen, Schneider, Meyer, and Bruce, (2008) investigated pregnancy-specific stress and birth outcomes among 279 mothers. They were assessed for state anxiety, perceived stress, life events, pregnancy-specific stress and health behaviors. The outcome variables
were gestational age at delivery, birth weight, preterm delivery (<37 weeks), and low birth weight (<2,500 g). Result revealed that a latent pregnancy specific stress factor predicted birth outcomes better than latent factors representing state anxiety, perceived stress, or life event stress. Controlling for obstetric risk, pregnancy-specific stress was associated with smoking, caffeine consumption, unhealthy eating, inversely associated with healthy eating, vitamin use, exercise, and gestational age at delivery. Cigarette smoking predicted lower birth weight. Clinically-defined birth outcomes were predicted by cigarette smoking and pregnancy-specific stress. Study concluded that pregnancy-specific stress contributed directly to preterm delivery and indirectly to low birth weight through its association with smoking. pregnancy-specific stress may be a more powerful contributor to birth outcomes than general stress.

Beebe Lee, Carrieri-Kohlman and Humphreys (2007) did a longitudinal, descriptive study to assess the levels of anxiety and self-efficacy for childbirth among thirty-five nulliparous women, between the age of 18 to 40 years, more than or equal to 38 weeks’ gestation, with uncomplicated pregnancy and also identify relationships prehospitalization labor pain, management strategies, and hospital admission status. All participants had a significant other (husband or partner) and attended childbirth education programs. Prenatal anxiety was significantly related to self-efficacy for childbirth in late pregnancy, labor pain, number of hours at home in labor, and admitting cervical dilation. The number of management strategies used was related to pain scores during labor before hospital admission. Women who spent longer periods of time at home in labor arrived at the hospital with a greater cervical dilation. Study concluded that antenatal characteristics influence intrapartal outcomes.
Saunders, Lobel, Veloso and Meyer (2006) tested the hypothesis that women with greater prenatal maternal stress (PNMS) more likely to receive intravenous opiates and epidural for delivery, and thereby increase the likelihood of unplanned cesarean delivery. PNMS was assessed during early, mid and late pregnancy using psychometrically sound instruments in structured interviews with women receiving prenatal care at a public university clinic. Medical records were abstracted for analgesia during delivery, fetal heart tracing (FHT) abnormalities, and method of delivery. Only subjects attempting vaginal delivery (N = 298) were included. Using structural equation modeling, a PNMS variable was constructed from five indicators: pregnancy-specific distress, number of prenatal stressful life events, distress from life events, state anxiety, and perceived stress. After controlling for medical predictors of analgesia receipt and surgical delivery, women with higher PNMS were more likely to receive analgesia, and those who received analgesia were more likely to deliver surgically. Analgesia was also associated with FHT abnormalities, which in turn was associated with surgical delivery (all p’s < 0.05). Women who received both an epidural and meperidine were most likely to have a cesarean delivery; 29% of this group delivered surgically. Results indicate that PNMS contributes to higher likelihood of unplanned cesarean delivery through its association with delivery analgesia.

Yasmin Neggers, Robert Goldenberg, Suzanne Cliver and John Hauth (2006) studied the influence of psychosocial factors such as stress, anxiety, depression, and self-esteem on birth weight among 3,149 low-income, African-American pregnant women. A 28-item psychosocial scale was used to measure the constructs of negative and positive effect, self-esteem, mastery, worry, and stress. Maternal health practices were assessed with 11 questions dealing with
diet, exercise, and the use of preventive medical and dental services. Results confirmed that a low score on either scale indicated “poor” psychosocial or health practices status. Low birth weight, preterm delivery, and intrauterine growth retardation occurred in 10.9, 10.1 and 7.3% of the pregnant women respectively. In women with low psychosocial scores, the risk of both low birth weight and preterm delivery was 40% higher and the mean birth weight of infants was 51 g ($p=0.02$) lower as compared to women with high scores. Negative affect (a measure of depression) was the only factor significantly associated with both infant birth weight ($\beta = -71.2, p=0.001$) and low birth weight (AOR = 1.4, 95% CI = 1.1–1.7). When data were stratified by body mass index, the adverse effect of negative affect scores on birth weight and low birth weight was present only in thin women. Health practice scores were not associated with any of the pregnancy outcome. Study concluded that thin women with a poor psychosocial profile and who were depressed during pregnancy were at increased risk of giving birth to low birth weight and preterm infants.

Berle Mykletun, Daltveit, Rasmussen, Holsten and Dahl (2005) examined the effects of anxiety disorder and depression in pregnant women on neonatal outcomes, and compared neonatal outcomes between offspring of attendees and non-attendees at Norway among 680 pregnant women using Hospital Anxiety and Depression Rating Scale. Gestational length, birth weight, and Apgar scores were also obtained. Result revealed that pregnancy anxiety and depression were associated with lower Apgar score at one minute and five minutes. No confounders were identified. Anxiety disorder and depression during pregnancy was not associated with low birth weight or preterm delivery. Offspring of non-attendees had a lower birth weight (77 g $p=0.001$) and a shorter gestational
length (1.8 days; p=.006) than that of offspring of attendees, a difference that may be explained by a higher load of psychosocial risk factors among the non-attendees. Study concluded that low Apgar score in offspring of women with anxiety disorder may indicate poor neonatal adaptation.

Mancuso, Schette, Rini, Roesch, Hobel (2004) investigated the association between the prenatal stress, anxiety, and elevated levels of maternal plasma corticotropin-releasing hormone (CRH) prenatal anxiety and CRH on the length of gestation among 282 pregnant women at 18 to 20 weeks (Time 1) and 28 to 30 weeks gestation (Time 2) that at both, CRH and maternal prenatal anxiety would be negatively associated with gestational age at delivery. CRH was also expected to mediate the relationship between maternal prenatal anxiety and gestational age at delivery. Findings supported the mediation hypothesis at Time 2, indicating that women with high CRH levels and high maternal prenatal anxiety at 28 to 30 weeks gestation delivered earlier than women with lower CRH levels and maternal prenatal anxiety. Women who delivered preterm had significantly higher rates of CRH at both 18 to 20 weeks gestation and 28 to 30 weeks gestation (p <0.001) compared with women who delivered term. These findings are the first to link both psychosocial and neuroendocrine factors to birth outcomes in a prospective design.

Dole, Savitz, Hertz-Picciotto, Siega-Riz, McMahon and Buekens (2003) examined psychosocial factors, including life events, social support, depression, pregnancy-related anxiety, perceived discrimination, and neighborhood safety in relation to preterm birth (<37 weeks) in a prospective cohort study of 1,962 pregnant women in central North Carolina. There was an increased risk of preterm birth among women with high counts of pregnancy-related anxiety (RR= 2.1, 95%
CI- 1.5, 3.0), with life events to which the respondent assigned a negative impact weight (RR = 1.8, 95% CI: 1.2, 2.7), and with a perception of racial discrimination (RR = 1.4, 95% CI: 1.0, 2.0). Different levels of social support or depression were not associated with preterm birth. Preterm birth initiated by labor or ruptured membranes was associated with pregnancy-related anxiety among women assigning a high level of negative impact weights (RR = 3.0, 95% CI: 1.7, 5.3). The association between high levels of pregnancy-related anxiety and preterm birth was reduced when restricted to women without medical comorbidities.

Dayan, Creveuil, Herlicoviez Herbel, Baranger, Savoye and Thouin (2002) investigated the effects of antenatal anxiety and depression on spontaneous preterm labor among 634 pregnant women with singleton pregnancies using Spielberger's State-Trait Anxiety Inventory and the Edinburgh Depression Scale. Result revealed that depression was positively associated with the outcome among underweight women, with a prepregnancy body mass index below 19 (OR = 6.9, 95% CI: 1.8, 26.2). A similar result was observed for trait anxiety in women with a history of preterm labor (adjusted OR = 4.8, 95% CI: 1.1, 20.4). The association was close to significance for state anxiety in women with vaginal bleeding (adjusted OR = 3.6, 95% CI: 0.9, 14.7). These findings supported that anxiety and depression, when combined with specific biomedical factors, are associated with spontaneous preterm labor.

Johnson, Slade (2002) did prospective study to associate prenatal maternal stress and delivery analgesia and unplanned cesareans at UK among four hundred and forty-three pregnant women, recruited at 32 weeks of gestation, over 16 years of age. Participants completed self-assessment, postal questionnaires assessing fear of labour and anxiety using the Wijma Delivery Expectancy Scale.
(W-DEQ) and the Speilberger State Trait Anxiety Scale (STAI), together with their expectations about their mode of delivery. Delivery information was gathered via birth summary sheets. Emergency caesarean section was associated with previous caesarean section, parity, age and a score reflecting medical risk, but not fear of childbirth or anxiety measures. There were no differences in fear between women experiencing spontaneous-vertex, forceps/ventouse, emergency or elective caesarean deliveries. The W-DEQ was factor analysed and was found to measure four distinct domains: fear, lack of positive anticipation and the degree to which women anticipate isolation and riskiness in childbirth. However, these individual factors also failed to contribute to the prediction of mode of delivery. Primiparous women in the UK sample showed highly elevated fear scores when compared with a Swedish sample. Such discrepancies were not found for the multiparous sample.

Holzman Jetton, Siler-Khodr, Fisher and Rip (2001) evaluated the relationship between maternal corticotropin-releasing hormone (CRH) levels in second trimester, and the risk of preterm delivery in an ethnically heterogeneous sample of pregnant women. The nested case-control study included two case groups (97 women who delivered before 35 weeks' gestation, 144 who delivered at 35--36 weeks' gestation), and a control group (244 women who delivered at or after 37 weeks' gestation) frequency matched by ethnicity (black, white) and by alpha-fetoprotein levels (normal, unexplained high). Corticotropin-releasing hormone was evaluated in stored maternal sera collected at 15--19 weeks' gestation from cases and controls. Delivery before 35 weeks gestation was associated positively with a second trimester, ethnic-specific CRH above 1.5 multiples of the median in white women (OR 2.3, 95% CI 1.1, 5.1) and black women (OR 5.0, 95% CI 1.8, 13.3). Study concluded that the factors that lead to a premature
increase in placental CRH production and are associated with an increased risk of preterm birth evident as early as 15–19 weeks' pregnancy.

Rini, Killingsworth, Schetter, Christine, Wadhwa, Pathik, Sandman, and Curt (1999) assessed the prenatal psychosocial predictors of infant birth weight and length of gestation among 120 Hispanic and 110 White pregnant women. Hypotheses focused on personal resources (mastery, self-esteem, optimism), prenatal stress (state and pregnancy anxiety), and socio cultural factors (income, education, ethnicity). Results confirmed that women with stronger resources had higher birth weight ($\beta = -0.21$), whereas those reporting more stress had shorter gestations babies ($\beta = -0.67$), being $\beta = -0.20$). Resources were also associated with lower stress, married, being White, having higher income and education, and giving birth for the first time.

Subhasri Mishra, Mohapatra, Rath, Swain and Samrat Kar (1993) did a study to identify the effects of psychosocial stressors during pregnancy on the gestational age of the newborn at SCB Medical College Hospital, Cuttack among patients admitted in the postnatal ward using Presumptive Stressful Life Events (PSLE) Scale and a questionnaire designed for this purpose. Result revealed that 71.1% had term delivery and 28.9% had preterm delivery. A significant association found between preterm delivery with psychosocial stressors such as poor socioeconomic status and illiteracy. Marriages of dependent relatives, lack of child, and lack of son were stated to be important factors causing stress during pregnancy.

Wadhwa Sandman, Porto, Dunkel-Schetter and Garite (1993) assessed the relationship of maternal plasma concentrations of CRH in the early third trimester of gestation with two prematurity-related outcomes—spontaneous preterm
birth (PTB), and small-for-gestational age birth (SGA), and determined the effects of CRH on each of these outcomes among 232 women with a singleton, intrauterine pregnancy, maternal plasma was collected at 33 weeks' gestation and CRH concentrations were determined by radioimmunoassay. Each pregnancy was dated on the basis of last menstrual period and early ultrasonography. Parity, obstetric risk conditions for prematurity, mode of delivery, and birth outcomes were abstracted from the medical record. After adjusting for the effects of established obstetric risk factors, elevated CRH levels at 33 weeks' gestation were significantly associated with a 3.3-fold increase in the adjusted relative risk (RR) for spontaneous preterm birth and with a 3.6-fold increase in the adjusted relative risk for fetal growth restriction. Women who delivered postterm had significantly lower CRH levels in the early third trimester than those who delivered at term. When outcomes were stratified by gestational length and birth weight, the lowest CRH levels at 33 weeks' gestation were associated with the term non-SGA births, intermediate and approximately equal CRH levels were associated with the preterm non-SGA and term SGA births, and the highest CRH levels were associated with the preterm SGA births. Findings concluded that humans placental CRH may play an impending, direct role in not only the physiology of parturition but also in processes related to fetal growth and maturation and the timing of onset of parturition determined or influenced by events occurring earlier in gestation rather than those close to the time of actual onset of labor.

2.1.4 Effects of maternal stress and anxiety on Foetus and newborn

Insaf, Fortner, Pekow, Dole, Markenson, Taber L (2011) did a study on prenatal stress, anxiety, and depressive symptoms as predictors of intention to breastfeed among 424 Hispanic women. The Perceived Stress Scale (PSS), the
State-Trait Anxiety Inventory (STAI), and the Edinburgh Postnatal Depression Scale (EPDS) were administered by bilingual interviewers in early pregnancy (mean 13.6 weeks gestation) and midpregnancy (mean 25.7 weeks gestation). Information on sociodemographic, behavioral, and acculturation factors was also collected. Breastfeeding intention was abstracted from medical records. A total of 274 (64.6%) women reported a positive intention to breastfeed. In multivariate analyses, women in the highest quartile of perceived stress (PRR 0.76, 95% CI 0.62-0.94) in early pregnancy and highest quartile of anxiety in early pregnancy (PRR 0.66, 95% CI 0.54-0.81) and mid pregnancy (PRR 0.80, 95% CI 0.64-1.00) were less likely to intend to breastfeed compared to women in the lowest quartile. Women who had at least probable minor depression (EPDS score ≥13) (PRR 0.79, 95% CI 0.65-0.95) or probable major depression (EPDS score ≥15) (PRR 0.77, 95% CI 0.62-0.96) during midpregnancy were less likely to intend to breastfeed compared to women without depressive symptoms. Similarly, women with persistent depressive symptoms over pregnancy were 24% -33% less likely to intend to breastfeed compared to women without depressive symptoms. Psychosocial risk factors during pregnancy are important predictors of breastfeeding intention among Hispanic women.

Barker, Jaffee, Uher and Maughan (2011) studied the adverse effect of both pre and postnatal maternal anxiety and depression on the development of offspring, co-occurring prenatal risks that influence maternal prenatal anxiety and depression, the relative contributions of prenatal and postnatal maternal anxiety and depression on child functioning were studied using 3,298 mother-offspring pairs. Measurements of maternal anxiety and depression were collected at two time points at 32 weeks prenatal and 1.5 years postnatal. Other prenatal risks were
assessed between 8 and 32 weeks of gestation. Child outcomes were ordered-categorical measures of DSM-IV externalizing and internalizing disorders, an assessment of verbal IQ. Both the prenatal and postnatal periods, maternal depression had a wider impact on different types of child maladjustment than maternal anxiety, which appeared more specific to internalizing difficulties in the child. Results suggest that addressing both maternal anxiety and depression, in the prenatal and postnatal periods as well as associated risk factor be the most effective approach to prevent adverse outcomes in the offspring.

Megan Blair, Glynn, Sandman and Davis (2011) found the consequences of exposure to prenatal maternal anxiety for the development of child temperament among 120 healthy, 2-year-old children. Prenatal maternal state and pregnancy-specific anxiety (PSA) were measured five times during pregnancy, and maternal state anxiety was measured again at 2 years post partum. Child temperament was measured at 2 years using the Early Childhood Behavior Questionnaire. The relationship between the trajectory of maternal anxiety across gestation and negative affectivity was evaluated using hierarchical linear growth curve modeling. Higher maternal PSA between 13 and 17 weeks of gestation was associated with increased negative temperament in the children. This association could not be explained by postnatal maternal anxiety, demographic, or obstetric factors. Prenatal maternal state anxiety was not associated with child temperament. These findings demonstrate that PSA early in gestation has a distinctive influence on the developing fetus.

Nasreen, Kabir, Forsell, Maigun and Edhborg (2010) investigated the independent effect of maternal antepartum depressive and anxiety symptoms on infant LBW among women in Bangladesh. A sample of 720 pregnant women from
two rural subdistricts was assessed for symptoms of antepartum depression, using the Edinburgh Postpartum Depression Scale (EPDS), and antepartum anxiety, using the State Trait Anxiety Inventory (STAI), and followed for 6-8 months postpartum. Infant birth weight of 583 (81%) singleton live babies born at term (≥37 weeks of pregnancy) was measured within 48 hours of delivery. Baseline data provided socioeconomic, anthropometric, reproductive, obstetric, and social support information. Results revealed that after adjusting for potential confounders, depressive (OR = 2.24; 95% CI 1.37-3.68) and anxiety (OR = 2.08; 95% CI 1.30-3.25) symptoms were significantly associated with LBW (≤2.5 kg). Poverty, maternal malnutrition, and support during pregnancy were also associated with LBW. Study provided evidence that maternal depressive and anxiety symptoms during pregnancy predict the LBW of newborns and replicates results found in other South Asian countries. Policies aimed at the detection and effective management of depressive and anxiety symptoms during pregnancy may reduce the burden on mothers and also act as an important measure in the prevention of LBW among offspring.

Grant, McMahon Austin, Reilly Leader, and Ali (2009) examined the separate and combined influences of maternal prenatal anxiety disorder and postnatal care giving sensitivity on infants' salivary cortisol responses to the still-face procedure. Effects were assessed by measuring infant salivary cortisol upon arrival at the laboratory, and at 15, 25, and 40 in following the still-face procedure. Maternal symptoms of anxiety during the last 6 months of pregnancy were assessed using clinical diagnostic interview. Prenatal anxiety and maternal sensitivity emerged as independent, additive moderators of infant cortisol reactivity, F (3, 180) = 3.29, p = .02, F (3, 179) = 2.68, p = .05 respectively.
Infants' stress-induced cortisol secretion patterns appear related to exposure to maternal prenatal anxiety.

Zanardo, Gasparetto, Giustardi, Suppiej, Trevisanuto Pascoli and Freato (2009) found impact of anxiety in the puerperium on breast-feeding outcomes. The state-trait anxiety inventory Y form (Spielberger, 1983) was administered to a total of 204 mothers, 101 primiparae, and 103 pluriparae on the third to fourth day postpartum. The primiparae had state anxiety (T) scores significantly higher than pluriparae (44.57 +/- 5.85 vs 43.28 +/- 7.10, P = 0.03). Increased state anxiety levels impaired breast-feeding success, factors predictive of breast-feeding longer than 3 months, maternal state anxiety was the most significant risk factor (odds ratio 0.99; 0.88-0.98 p < 0.01). During puerperium, anxiety, potentially exacerbated by primiparae inexperience, is associated with impaired lactation. Alleviating maternal anxiety could be beneficial for stimulating breast-feeding in more vulnerable women.

Bergman, Sarkar, Glover and O'Connor (2008) studied the effects of prenatal stress on offspring development behavioural and cognitive development of the child among 123 women. Laboratory-based assessment of the children's cognitive development and fearfulness were assessed during 17 months, child-parent attachment quality was assessed using the Strange Situation. There was a moderate link between antenatal stress and observed fearfulness. The effect of antenatal stress on fearfulness was most accentuated in children with an Insecure/Resistant attachment classification. Attachment did not moderate the effects of antenatal anxiety on cognitive development. These findings provide the first human evidence that postnatal parenting moderate the adverse effects of
antenatal stress. These results raise developmental questions about the timing and effect of interventions to reduce the adverse effects of antenatal stress exposure.

Davis Glynn, Schetter, Hobel Chicz-Demet and, Sandman (2007) evaluated the effects of prenatal maternal psychosocial (anxiety, depression, and perceived stress) and endocrine (cortisol) indicators of stress on infant temperament among 247 full-term infants. Maternal salivary cortisol and psychological state were evaluated at 18-20, 24-26, and 30-32 weeks of gestation and at 2 months postpartum. Infant temperament was assessed with a measure of negative reactivity (the fear subscale of the Infant Temperament Questionnaire) at 2 months of age. Results showed that elevated maternal cortisol at 30-32 weeks of gestation, but not earlier in pregnancy, significantly associated with greater maternal report of infant negative reactivity. Prenatal maternal anxiety and depression additionally predicted infant temperament. The associations between maternal cortisol and maternal depression remained after controlling for postnatal maternal psychological state. The prenatal exposure to maternal stress has consequences for the development of infant temperament.

DiPietro, Novak Costigan, Atella and Reusing (2006) studied the maternal reports of anxiety, pregnancy-specific and nonspecific stress, and depressive symptoms during mid-pregnancy and at 6 weeks and 24 months after birth among healthy women with low risk pregnancies. Developmental assessment and cardiac vagal tone monitoring were administered to 94 children at age of two. Higher levels of prenatal anxiety, nonspecific stress, and depressive symptoms were associated with more advanced motor development in children after postnatal control for each psychological measure; anxiety and depression were also significantly and positively associated with mental development.
Austin, Hadzi-Pavlovic Leader, Saint, and Parker (2005) assessed the link between maternal trait anxiety (STAI), perceived life event (LE) stress and depression (Edinburgh scale) and infant temperament among 970 women in the third trimester of pregnancy by psychological self-report questionnaires, infant temperament was evaluated at 4 and 6 months by maternal and paternal report, depression (concurrent Edinburgh scale) was assessed at four and six months. Univariate logistic regressions indicated that the pregnancy STAI (>40) scores were associated with 2.56- and 1.57-fold increases (maternal and paternal, respectively), in the odds of "difficult" infant temperament at 4 or 6 months. Concurrent Edinburgh scores (OR of 3.06 and 2.64 for maternal reports, respectively) were also predictive of infant temperament. Age, education, income, marital status, obstetric complications, infant gender and prematurity were not predictive of infant temperament. In stepwise multiple logistic regression analyses, the antenatal trait STAI (odds ratio 1.96) significantly predicted maternal reports of "difficult" temperament at 4 or 6 months independent of both antenatal and postnatal depression scores. There were similar trends for paternal reports of "difficult" temperament but these were not significant. Antenatal depression and perceived LE stress were not predictive of temperament. Women (N=14) reporting domestic violence (DV) in pregnancy had highly significant increased Edinburgh and STAI scores. Findings concluded that maternal trait anxiety was predictive of "difficult" infant temperament, independent of "concurrent" depression and key socio demographic and obstetric risk factors.

Gutteling, Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser, and Buitelaar (2005) examined the influence of prenatal stress on infant temperament and problem behavior by self-report data on stress and anxiety, and levels of
cortisol in saliva among nulli-parous women during pregnancy. Temperament of the child was measured at 27 months by parental report on the Infant Characteristics Questionnaire. Behavior of the child was assessed by direct observation during the administration of the Bayley Scales of Development 2–30, and by parental report on the Child Behavior Checklist 2–3. Result revealed that perceived stress during pregnancy was a predictor of lower levels of restless/disruptive temperament (OR=0.77), more total behavioral problems (OR=1.17), and more externalizing behavioral problems (OR=1.12) in 2-year-olds. Fear of bearing a handicapped child was a predictor of higher levels of restless/disruptive temperament (OR=1.39) and more attention regulation problems in toddlers (OR=1.46). Increased levels of maternal prenatal stress appear to be associated with temperamental and behavioral problems in toddlers.

Glover, O'Connor, Heron and Golding (2004) tested the hypothesis of association between antenatal maternal anxiety with altered lateralization in children, among 7431 mother-child pairs through the prospective longitudinal study that has followed women since pregnancy. The data collected on maternal anxiety which was measured at 18- and 32-week gestation and 8 weeks postnatally using a self-report inventory. Child handedness was assessed at 42 months using an established maternal report scale. Information on maternal and paternal handedness, as well as data on possible confounding variables such as obstetric and antenatal risks also assessed. Univariable analysis showed that antenatal anxiety at 18 weeks was associated with mixed-handedness in the child, OR=1.28 (95% CI 1.09-1.50, p<0.01), boys were more likely than girls to be mixed handed, the link with antenatal anxiety was similar. There was no significant association with antenatal anxiety at 32 weeks. Multivariable analyses
indicated that maternal anxiety at 18 weeks of pregnancy predicted an increased likelihood of mixed-handedness in the child (OR=1.23, 95% CI 1.02-1.48, p<0.05), independently of parental handedness, obstetric and other antenatal risks, and postnatal anxiety.

Buitelaar, Huizink, Mulder de Medina and Visser (2003) studied the influence of maternal stress during pregnancy on the developing fetus, resulting in delay of motor and cognitive development and impaired adaptation to stressful situations. These effects mediated by the hypothalamic–pituitary–adrenal (HPA) axis. Self-report data about daily hassles and pregnancy-specific anxiety and salivary cortisol levels collected in nulliparous pregnant women. Dependent measures were scores on the Bayley Scales of Infant Development and on temperamental questionnaires at 3 and 8 months. Pregnancy-specific anxiety in mid pregnancy predicted lower mental and motor developmental scores at 8 months. Early morning values of cortisol in late pregnancy were negatively related to both mental and motor development at 3 months and motor development at 8 months. Pregnancy-specific anxiety explained 7% of the variance of test-affectivity and goal-directedness at 8 months. Increased maternal stress during pregnancy seems to be one of the determinants of temperamental variation and delay of development of infants and may be a risk factor for developing psychopathology later in life.

Field, Diego, Hernandez-Reif, Schanberg, Kuhn, Yando and Bendell (2003) examined one hundred and sixty-six women and who are classified as experiencing high or low anxiety during the second trimester of pregnancy. The high anxiety women also had high scores on depression and anger scales. In a follow-up across pregnancy, the fetuses of the high anxiety women were noted to
be more active and to experience growth delays. The high anxiety mothers' high prenatal norepinephrine and low dopamine levels were followed by their neonates having low dopamine and serotonin levels. The high anxiety mothers' newborns also had a greater relative right frontal EEG activation and lower vagal tone. Finally, the newborns of high anxiety mothers spent more time in deep sleep and less time in quiet and active alert states and showed more state changes and less optimal performance on the Brazelton Neonatal Behavior Assessment Scale (motor maturity, autonomic stability and withdrawal). These data highlight the need for prenatal intervention for elevated anxiety symptoms during pregnancy.

2.1.5 Management of stress and anxiety during pregnancy

Ventura, Gomes and Carreira (2012) evaluated the relaxing intervention on pregnant women awaiting amniocentesis for cortisol and anxiety response among 154 pregnant women awaiting amniocentesis. They were randomly assigned in the morning and the afternoon to three groups for 30 min: (1) listening to relaxing music, (2) sitting and reading magazines, and (3) sitting in the waiting-room. Before and after that period, they completed the Spielberger's State and Trait anxiety inventory and provided blood samples for cortisol. The groups were then compared regarding change in cortisol levels and anxiety, maternal cortisol and state anxiety were correlated ($r=0.25$, $p=0.04$) in the afternoon, but not in the morning. The larger decreases in cortisol occurred in the music group (-61.8 nmol/L, ANOVA: $p=0.01$), followed by magazine, being differences among groups more pronounced in the morning. Women in the music group also exhibited greater decreases in state anxiety ($p<0.001$). Younger mothers with less gestational age were on an average the most anxious, and also the ones with greater decreases in cortisol and anxiety levels after relaxation. A relaxing intervention as short as 30
min, especially listening to music, decreases plasma cortisol and self-reported state anxiety score. Pregnant women benefit from the routine practice of relaxation in the imminence of clinical stressful events.

Alder, Urech, Fink Bitzer and Hoesli (2011) examined psychoendocrine at baseline differences and changes after a standardized relaxation period in pregnant women with high versus low levels of anxiety. Thirty-nine third-trimester high and low anxious pregnant women performed active or passive relaxation while levels of anxiety, hypothalamic-pituitary-adrenal (HPA) axis and sympathetic-adrenal-medullary (SAM) system activity were assessed before and after the relaxation period. In women with high levels of trait anxiety, state anxiety (F(1,36) = 8.3, p = .007) and negative affect (F(1,36) = 7.99, p = .008) as well as ACTH (F(1,35) = 9.24, p = .002) remained elevated over the entire course of the experimental procedure, the last indicating increased HPA axis activity. In addition, norepinephrine showed a constricted decrease of relaxation reflecting lower response of the SAM-system (F(1,37) = 4.41, p = .043). Although relaxation exercises have become a standard intervention for individuals with anxiety, pregnant women with high levels of trait anxiety benefited less than women with low levels from a single standardized relaxation period.

Marc, Toureche, Ernst, Hodnett, Blanchet Dodin and Njoya (2011) assessed the benefits of mind-body interventions during pregnancy in preventing or treating women's anxiety and in influencing perinatal outcomes. The study reviewed the Cochrane Pregnancy and Childbirth Group's Trials Register (30 November 2010), MEDLINE (1950 to 30 November 2010), EMBASE (1974 to 30 November 2010), the National Center for Complementary and Alternative Medicine (NCCAM) (1 December 2010), ClinicalTrials.gov (December 2010) and
Current Controlled Trials (1 December 2010), searched the reference lists of selected studies and contacted professionals and authors in the field. The selection criteria: Randomized controlled trials, involving pregnant women of any age at any time from conception to one month after birth, comparing mind-body interventions with a control group. Mind-body interventions included autogenic training, biofeedback, hypnotherapy, imagery, meditation, prayer, auto-suggestion, tai-chi and yoga. The control group included: standard care, other pharmacological or non-pharmacological interventions, other types of mind-body interventions or no treatment at all. Included eight trials (556 participants), evaluating hypnotherapy (one trial), imagery (five trials), autogenic training (one trial) and yoga (one trial). Due to the small number of studies per intervention and to the diversity of outcome measurements, meta-analysis was not performed and reported results individually for each study. Compared with usual care, in one study (133 women), imagery may have a positive effect on anxiety during labor decreasing anxiety at the early and middle stages of labor (MD -1.46; 95% CI -2.43 to -0.49; one study, 133 women) and (MD -1.24; 95% CI -2.18 to -0.30). Another study showed that imagery had a positive effect on anxiety and depression in the immediate postpartum period. Autogenic training might be effective for decreasing women's anxiety before delivering. The study concluded that mind-body interventions might benefit women's anxiety during pregnancy.

Baldwin, Ajel and Garner (2010) said Generalized anxiety disorder (GAD) is common in community and clinical settings. The individual and societal burden associated with GAD is substantial, evidence-based guidelines for the pharmacological management of patients with GAD have recommended initial treatment with either a selective serotonin reuptake inhibitor (SSRI) or a serotonin-
norepinephrine reuptake inhibitor (SNRI), There is much room for improvement in both the efficacy and the tolerability of treatment. Many patients worry about becoming dependent on medication, a substantial proportion experience troublesome adverse effects, and these problems limit the effectiveness of pharmacological treatments in clinical practice. The relative lack of longitudinal studies of clinical outcomes in GAD, and the small number of placebo-controlled relapse prevention studies lead to uncertainty about the optimal duration of treatment after a satisfactory initial response. Future treatment guidelines for GAD will be influenced by emerging data for established and novel pharmacological approaches, and possibly through the more accurate identification of certain patient subgroups who are likely to respond preferentially to particular interventions.

Urech, Fink, Hoesli, Wilhelm, Bitzer and Alder (2010) compared the immediate effects of two active and one passive 10-min relaxation technique on perceived and physiological indicators of relaxation among 39 healthy pregnant women at university Women's Hospital Basel. A randomized controlled trial with an experimental repeated measure design was used, participants were assigned to one of two active relaxation techniques, progressive muscle relaxation (PMR) or guided imagery (GI), or a passive relaxation control condition. Self-reported relaxation on a Visual Analogue Scale (VAS) and state anxiety (STAI-S), endocrine parameters indicating hypothalamic-pituitary-adrenal (HPA) axis (cortisol and ACTH) and sympathetic-adrenal-medullary (SAM) system activity (norepinephrine and epinephrine), as well as cardiovascular responses (heart rate, systolic and diastolic blood pressure) were measured at four time points before and after the relaxation exercise. Between group differences showed, that compared to the PMR and control conditions, GI was significantly more effective in enhancing
levels of relaxation and together with PMR, GI was associated with a significant decrease in heart rate. Within the groups, passive as well as active relaxation procedures were associated with a decline in endocrine measures except epinephrine. Taken together, these data indicate that different types of relaxation had differential effects on various psychological and biological stress systems. GI was especially effective in inducing self-reported relaxation in pregnant women while at the same time reducing cardiovascular activity.

Chang Chen Huang (2008) did a randomized experimental study design to assess the effects of music therapy on psychological stress during pregnancy. Two hundred and thirty-six pregnant women were randomly assigned to music therapy ($n = 116$) and control ($n = 120$) groups. The music therapy group received two weeks of music intervention. The control group received only general prenatal care. Psychological health was assessed using three self-report measures such as perceived Stress Scale (PSS), State Scale of the State-Trait Anxiety Inventory (S-STAI) and Edinburgh Postnatal Depression Scale (EPDS). The result revealed that the music therapy group showed significant decrease in PSS, S-STAI and EPDS after two weeks. The control group only showed a significant decrease in PSS after two weeks. This decrease was not as substantial as in the experimental group. An ANCOVA test with the pretest scores as the control revealed that the changes in PSS, S-STAI and EPDS after two weeks were significantly decreased in the experimental group compared with the control group. The controlled trial provides preliminary evidence that two-week music therapy during pregnancy provides quantifiable psychological benefits. The findings can be used to encourage pregnant women to use this cost-effective method of music in their daily life to reduce their stress, anxiety and depression.
DiPietro, Costigan, Nelson, Gurewitsch, and Laudenslager (2008) identified fetal responses to induced maternal relaxation during the 32nd week of pregnancy were recorded in 100 maternal–fetal pairs using a digitized data collection system. The 18-min guided imagery relaxation manipulation generated significant changes in maternal heart rate, skin conductance, respiration period, and respiratory sinus arrhythmia. Significant alterations in fetal neurobehavior were observed, including decreased fetal heart rate (FHR), increased FHR variability, suppression of fetal motor activity (FM), and increased FM–FHR coupling. Attribution of the two fetal cardiac responses to the guided imagery procedure itself, as opposed to simple rest or recumbency, is tempered by the observed pattern of response. Evaluation of correspondence between changes within individual maternal–fetal pairs revealed significant associations between maternal autonomic measures and fetal cardiac patterns, lower umbilical and uterine artery resistance and increased FHR variability, and declining salivary cortisol and FM activity.

Nacy, Bourugion, Cheryltaylor, Gill and Sharon (2008) determined the effects of relaxation guided imagery (R-GI) as a primary prevention strategy for stress management during second trimester of pregnancy. All participants documented perceived benefits of R-GI that includes improved breathing ability to relax, clear one’s mind and become calm. Ability to channel and decrease stress, release anxiety, control anger and improve ability to fall and stay asleep.

Vieten and Astin (2008) conducted a randomized trial to assess the effectiveness of eight-week mindfulness-based intervention on reducing stress and improving mood in pregnancy and early postpartum among 31 women. The study group received the intervention during the last half of their pregnancy to a wait-list
control group. Measures of perceived stress, positive and negative effect, depressed and anxious mood, and affect regulation were collected prior to, immediately following, and three months after the intervention (postpartum).

Mothers who received the intervention showed significantly reduced anxiety (effect size, 0.89; \( p < 0.05 \)) and negative affect (effect size, 0.83; \( p < 0.05 \)) during the third trimester in comparison to those who did not receive the intervention. The brief and nonpharmaceutical nature of this intervention makes it a promising effect during pregnancy.

Smith, Hancock, Blake-Mortimer and Eckert (2007) did a randomized comparative trial on yoga and relaxation as treatment modalities at 10 and 16 weeks to determine modality reduces stress, anxiety, blood pressure and quality of life. One hundred and thirty-one mothers with mild to moderate levels of stress in South Australia were chosen. Ten weekly 1-h sessions of relaxation or hatha yoga were given to the participant. Changes in the State Trait Personality Inventory sub-scale anxiety, General Health Questionnaire and the Short Form-36 were measured. Result revealed that the 10 week intervention stress, anxiety and quality of life scores improved over time. Yoga was found to be as effective as relaxation in reducing stress, anxiety and improving health status on seven domains of the SF-36. Yoga was more effective than relaxation in improving mental health. At the end of the 6 week follow-up period there were no differences between groups in levels of stress, anxiety and on five domains of the SF-36. Vitality, social function and mental health scores on the SF-36 were higher in the relaxation group during the follow-up period. Yoga appears to provide a comparable improvement in stress, anxiety and health status compared to relaxation.
Bastard and Tiran (2006) studied the effect of aromatherapy and massage on antenatal anxiety and its effect on the fetus as antenatal anxiety has been linked to maternal hypothalamic-pituitary-adrenal axis changes which can affect fetal development and may have lasting effects on the child's psychological development. Treatments for anxiety have hitherto focused on psychotherapy techniques or antidepressant drugs but these do not always effect long term improvement. Aromatherapy and massage have successfully been used to produce significantly greater improvement in reduction of anxiety. Midwives may highlight anxiety in some of the mothers in their care and can incorporate the holistic approach of aromatherapy and massage into their practice. However, further research is required to establish the efficacy and cost-effectiveness of aromatherapy and massage in the antenatal period.

Shamanthakamani Narendran, Raghuram Nagarathna, Vivek Narendran, Sulochana Gunasheela, and Hongasandra Rama Rao Nagendra (2005) studied the efficacy of yoga on pregnancy outcomes among three hundred thirty five women attending the antenatal clinic in Bangalore, India. Mothers between 18 and 20 weeks of pregnancy were enrolled 169 women in the yoga group and 166 women in the control group. Women were matched for age, parity, body weight, and Doppler velocimetry scores of umbilical and uterine arteries. Yoga practices, including physical postures, breathing, and meditation were practised by the yoga group one hour daily, from the date of entry into the study until delivery. The control group walked 30 minutes twice a day (standard obstetric advice) during the study period. Compliance in both groups was ensured by frequent telephone calls and strict maintenance of an activity diary. The result revealed that the number of babies with birth weight $\geq 2500$ grams was significantly higher ($p < 0.01$) in the
yoga group. Preterm labor was significantly lower ($p < 0.0006$) in the yoga group. Complications such as isolated intrauterine growth retardation (IUGR) ($p < 0.003$) and pregnancy-induced hypertension (PIH) with associated IUGR ($p < 0.025$) were also significantly lower in the yoga group. There were no significant adverse effects noted in the yoga group. Study concluded that an integrated approach to yoga during pregnancy is safe. It improves birth weight, decreases preterm labor, and decreases IUGR either in isolation or associated with PIH with no increased complications.

Rubinchik, Kablinger, and Suzette Gardner (2005) did an article review on the course of generalized anxiety disorder (GAD) and panic disorder during pregnancy and the postpartum period and presented guidelines for management. In English language electronic search of relevant studies using PubMed (January 1, 1985–January 2004) was performed. The search for terms anxiety and pregnancy, maternal mental illness, panic and pregnancy, psychotropic medications in pregnancy and treatment options in pregnancy were viewed. Review articles and primary pharmacologic treatment articles were selected for discussion. Despite the extensive use of psychotropic drugs such as antidepressants during pregnancy, there is a scarcity of information regarding the effect of such exposure on the developing fetus was noted. Review articles and primary pharmacologic treatment trials were analyzed and incorporated into the review based on adequate methodology, completeness of data, and information on pregnancy outcome. The goal of treatment during pregnancy and lactation is sufficient treatment for syndrome remission. To minimize the potential for neonatal withdrawal and maternal toxicity after delivery, vigilant monitoring of side effects is indicated. Non pharmacologic treatment, such as cognitive-
behavioral therapy, should be first-line treatment in pregnant women with GAD or panic disorder.

Bandelow, Josef Zohar, Eric Hollande, Siegfried Kasper and Hans-Jurgen Moller (2002) highlighted World Federation of Societies of Biological Psychiatry (WFSBP) Guidelines for the Pharmacological Treatment of Anxiety, Obsessive-Compulsive and Posttraumatic Stress Disorders recommended Selective serotonin reuptake inhibitors (SSRIs) are the first-line treatment for panic disorder. Tricyclic antidepressants (TCAs) are equally effective, but they are less well tolerated than the SSRIs. In treatment-resistant cases, benzodiazepines like alprazolam may be used when the patient does not have a history of dependency and tolerance. Due to possible serious side effects and interactions with other drugs and food components, the irreversible monamine oxidase inhibitor (MAOI) phenelzine should be used only when first-line drugs have failed. In generalised anxiety disorder, venlafaxine and SSRIs can be recommended, while buspirone and imipramine may be alternatives for social phobia, SSRIs are recommended for the first line, and MAOIs, moclobemide and benzodiazepines as second line. Obsessive-compulsive disorder is best treated with SSRIs or clomipramine.

Allaire, Moos, Wells (2000) determine the prevalence and types of complementary and alternative medicine therapies used by certified nurse-midwives in North Carolina. Surveys were sent to all 120 licensed certified nurse-midwives in North Carolina requesting information concerning their recommendations for use of complementary and alternative medicine for their pregnant or postpartum patients. Eighty-two responses were received (68.3%). Seventy-seven (93.9%) reported recommending complementary and alternative medicine to their pregnant patients in the past year. Forty-seven (57.3%) reported
recommending complementary and alternative medicine to more than 10% of patients. The percentage of nurse-midwives who recommended each type of complementary and alternative medicine was as follows: herbal therapy (73.2%), massage therapy (67.1%), chiropractic (57.3%), acupressure (52.4%), mind-body interventions (48.8%), aromatherapy (32.9%), homeopathy (30.5%), spiritual healing (23.2%), acupuncture (19.5%), and bioelectric or magnetic applications (14.6%). The 60 respondents who reported prescribing herbal therapies gave them for the following indications: nausea and vomiting, labor stimulation, perineal discomfort, lactation disorders, postpartum depression, preterm labor, postpartum hemorrhage, labor analgesia, and malpresentation.

Field, Hernandez-Reif, Hart, Theakston Schanberg and Kuhn (1999) studied the effect of massage among twenty-six pregnant women were assigned to a massage therapy or a relaxation therapy group for 5 weeks. The therapies consisted of 20-min sessions twice a week. Both groups reported feeling less anxious after the first session and less leg pain after the first and last session. Only the massage therapy group, however, reported reduced anxiety, improved mood, better sleep and less back pain by the last day of the study. In addition, urinary stress hormone levels (norepinephrine) decreased for the massage therapy group and the women had fewer complications during labor and their infants had fewer postnatal complications (e.g., less prematurity).

Rees (1995) conducted a pretest-posttest experimental design with a convenience sample of 60 subjects to examine the effects of a relaxation with guided imagery protocol on anxiety, depression, and self-esteem in primiparas during the first 4 weeks of the postpartum period. The results showed that the experimental group had less anxiety and depression and greater self-esteem than
did the control group at the end of the period. Positive correlations were obtained between anxiety and depression; negative correlations between self-esteem, anxiety and depression. All findings were significant at the .05 level.

2.1.6 Progressive muscle relaxation for stress and anxiety

Lee, Bhattacharya, Sohn, and Verres (2012) investigated the relaxation effect of Monochord (MC) sounds for patients during chemotherapy compared with progressive muscle relaxation (PMR). Two randomized groups of patients were observed during chemotherapy. One group listened to recorded Monochord (MC) sounds (n=20) and the other group listened to recorded PMR (n=20). Each session was investigated pre and post using Spielberger's State Anxiety Inventory (SAI) and a questionnaire about the patient's physical and psychological states. Further, for the first and the last session, multivariate electroencephalogram (EEG) signals were recorded. Patients in both MC and PMR groups showed significant improvement in their physical and psychological states and state anxiety. The EEG data showed that the MC and the PMR groups were associated with an increase of posterior theta (3.5-7.5 Hz) and a decrease of midfrontal beta-2 band (20-29.5 Hz) activity during the end phase of relaxation treatment. Further, the MC group was associated with decreased alpha band (8-12 Hz) activity in comparison with PMR group. This study showed that both listening to recorded MC sounds and practicing PMR have a useful and comparable effect on gynaecologic oncological patients during chemotherapy.

Pan, Zhang, Li (2012) explored the effects of progressive muscle relaxation training on anxiety and health-related quality of life of patients with ectopic pregnancy receiving methotrexate treatment. Ninety in-patients receiving this treatment were randomly assigned to a progressive muscle relaxation group (n
or a control group (n = 45). The control group received standard single-dose methotrexate treatment and the experimental group received methotrexate and additional muscle relaxation training until hospital discharge. The patients were evaluated with the state form of the State-Trait Anxiety Inventory and SF-36 shortly after admission and before discharge from the hospital. Both the covariance analysis and repeated measures ANOVA showed that muscle relaxation training can effectively improve the anxiety and health-related quality of life of patients with ectopic pregnancy receiving methotrexate treatment in an in-patient setting.

Vancampfort De Hert, Knapen, Maurissen, Raepsaet Deckx Remans and Probst(2011) examined the efficacy of a single progressive muscle relaxation session compared with a control condition on state anxiety, psychological stress, fatigue and subjective well-being in 88 patients with schizophrenia. Patients were randomly assigned to either a single progressive muscle relaxation session during 25 minutes or a resting control condition with the opportunity to read for an equal amount of time. Only within progressive muscle relaxation, participants (n=27) showed decreased state anxiety, psychological stress and fatigue and increased subjective well-being. Group differences in post scores were found for state anxiety, subjective well-being and psychological stress, but not for fatigue. The effect size favoring progressive muscle relaxation was 1.26 for subjective well-being and -1.25 and -1.02 for respectively state anxiety and psychological stress. Progressive muscle relaxation is highly effective in reducing acute feelings of stress and anxiety in patients with schizophrenia. A reduction in stress and state anxiety is associated with an increase in subjective well-being.
Dehdari, Heidarnia, Ramezankhani, Sadeghian, and Ghofranipour (2009) evaluated the effect of progressive muscular relaxation (PMR) training in decreasing anxiety and improving quality of life among anxious patients after coronary artery bypass graft surgery (CABG) among 110 anxious patients referred to the cardiac rehabilitation clinic of Tehran, Iran, during six weeks after Coronary Artery Bypass Graft (CABG). Patients were allocated to receive both exercise training and lifestyle education plus relaxation therapy (relaxation group; n=55) or only exercise training beside lifestyle education (control group or the recipient of usual care group; n=55). Duration of the relaxation therapy was 6 wks and in the case of usual care, it was 8 wks. Both the groups were followed up one month after completion of intervention. Anxiety and quality of life in the two treatment groups were compared. There were no significant differences in overall QOL, state anxiety and trait anxiety scores between the two groups before intervention. Significant reductions in state anxiety (P<0.01) and trait anxiety (P<0.01) levels were observed in relaxation group after intervention compared to control group. Women had high state anxiety and a low quality of life than men in the two groups before intervention. After intervention, there was no difference between men and women in the relaxation group. Findings showed that progressive muscular relaxation training may be an effective therapy for improving psychological health and quality of life in anxious heart patients.

Singh and Rao (2009) assessed acute effects of music and progressive muscle relaxation (PMR) in hospitalized COPD subjects after a recent episode of exacerbation. A randomized controlled study was performed of pre-test post-test design after recruiting 82 COPD subjects from Mangalore. 72 subjects were selected for the study. Demographic and baseline data were taken on the day
subjects were screened. Music group listened to a self selected music of 60-80 beats per minute for 30 minutes. PMR group practiced relaxation through a pre-recorded audio instructions of 16 muscle groups. Outcome variables were Spielberger's State Anxiety Inventory (SSAI), Spielberger's Trait Anxiety Inventory (STAI), dyspnea, systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse rate (PR) and respiratory rate (RR). There was statistically significant main effect across the sessions for state anxiety (F = 62.621, p = 0.000), trait anxiety (F = 19.528, p = 0.000), dyspnea (F = 122.227, p = 0.000), SBP (F = 63.885, p = 0.000), PR (F = 115.780, p = 0.000) and RR (F = 202.977, p = 0.000). There was statistically significant interaction effect between the two groups for state anxiety (F = 6.024, p = 0.003), trait anxiety (F = 8.222, p = 0.000), dyspnea (F = 10.659, p = 0.000), SBP (F = 12.889, p = 0.000), PR (F = 4.746, p = 0.008) and RR (F = 12.078, p = 0.000). There were greater changes observed after the second session in both the groups however, change in DBP was not significant in either groups. Music and PMR are effective in reducing anxiety and dyspnoea along with physiologic measures such as SBP, PR and RR in two sessions in COPD patients hospitalized with exacerbation. However, reductions in the music group were greater compared to the PMR group.

Nickel, Lahmann, Muehlbacher, Pedrosa Gil, Kaplan, Buschmann, Bachler Tritt, Kettle, Egger, Anvar, Fartacek, Loew, Rother and Nickel (2006) determined the efficacy of progressive muscle relaxation (PMR) on change in blood pressure, lung parameters, heart rate, anger and health-related quality of life in pregnant women with bronchial asthma among 64 pregnant women with bronchial asthma, an 8-week randomized, prospective, controlled trial. Thirty-two were selected for PMR, and 32 received a placebo intervention. The systolic blood
pressure, forced expiratory volume in the first second, peak expiratory flow and heart rate were tested, and the State-Trait Anger Expression Inventory and Health Survey (SF-36) were employed. A significant reduction in systolic blood pressure and a significant increase in both forced expiratory volume in the first second and peak expiratory flow were observed after PMR. The heart rate showed a significant increase in the coefficient of variation, root mean square of successive differences and high frequency ranges, in addition to a significant reduction in low and middle frequency ranges. A significant reduction on three of five State-Trait Anger Expression Inventory scales, and a significant increase on seven of eight SF-36 scales were observed. PMR appears to be an effective method to improve blood pressure, lung parameters and heart rate, and to decrease anger levels, thus enhancing health-related quality of life in pregnant women with bronchial asthma.

Cheung, Molassiotis Chang (2003) evaluated the effects of progressive muscle relaxation training (PMRT) on anxiety and quality of life in colorectal cancer patients after stoma surgery. A randomised controlled trial was used with repeated measures assessment over 10 weeks post-stoma surgery. Fifty-nine patients participated in the study were randomized to a control group receiving routine care (n=30) and an experimental group receiving routine care and PMRT through two teaching sessions and practice at home for the first 10 weeks. The State-Trait Anxiety Inventory and two Quality of Life Scales were used to collect the data of interest in three occasions, namely during hospitalization, at week 5 and at week 10 post-surgery. The use of PMRT significantly decreased state anxiety and improved generic quality of life in the experimental group (P<0.05), especially in the domains of physical health, psychological health, social concerns and environment. Social relationships were decreased in both groups. In relation to the
disease-specific quality of life measure, differences were observed only in the 10-week assessment, with the experimental group reporting better quality of life at 10 weeks, but not over time as compared to the control group. The findings suggested that use of PMRT in the long-term care of colorectal cancer patients, as it can improve their psychological health and quality of life. This may be a cost-effective intervention that needs minimal training and could easily be offered to those patients that they would like to use it as part of the specialist care provided to stoma patients.

Pawlow and Jones (2002) did a study with purpose of examine acute relaxation training, in the reductions in subjective and physiological indices of stress. Forty-six experimental subjects were led through Abbreviated Progressive Relaxation Training (APRT) exercises during two laboratory sessions spaced exactly 1 week apart. Fifteen control subjects experienced two laboratory sessions where they sat quietly for an equal amount of time. Results indicated that a brief relaxation exercise led to experimental subjects having significantly lower levels of post-intervention heart rate, state anxiety, perceived stress, and salivary cortisol than control subjects, as well as increased levels of self-report levels of relaxation. The results of this study may have implications for the use of relaxation training in enhancing immune function.
2.2. SECTION B : CONCEPTUAL WORK FRAME

Conceptual framework based on Sr.Callista L.Roy’s Adaptation Model (1976)

Investigator identified that Sr.Callista L.Roy’s adaptation model was suitable for the study. This model being one of the oldest had its inception in 1964. The Roy adaptation model is generally considered a "systems" model and also includes elements of an “interactional” model. The model was developed specifically for the individual client, but it can be adapted to families and to communities (Roy, 1983).

According to Callista L. Roy, the human being functions as a biopsychosocial individual with the holistic perspective. The person as living system on the whole is made up of parts or subsystems that function as unity for some purpose. Individual aspects of parts act together to form unified being and are in constant interactions with their environment. The goal of the human being is adaptation through interacting with the environment. The system includes inputs, controls and feedbacks.

The aim of nursing is to promote adaptation for individuals and groups in each of the four adaptive modes, thus contributing to health quality of life and dignity with dying” (Roy 1999). These four adaptive modes include the physiologic, self-concept, role function and interdependence. The adaptive model as a framework used to see a person who is constantly influenced by their environment; people have the chance to positively respond to their environment and adapt, or fail at adapting. It is the nurse who guides us in the succession of adaptation.
The person has two major internal processing subsystems, the regulator and the cognator. These subsystems are the mechanisms used by human beings to cope with stimuli from the internal and external environment. The regulator mechanism works primarily through the autonomic nervous system and includes endocrine, neural, and perception pathways. This mechanism prepares the individual for coping with environmental stimuli. The cognator mechanism includes emotions, perceptual/information processing, learning, and judgment. The process of perception bridges the two mechanisms (Roy and Roberts, 1981).

Three types of stimuli influence an individual’s ability to cope with the environment. These include focal stimuli, contextual stimuli, and residual stimuli. Focal stimuli are those that immediately confront the individual in a particular situation. Contextual stimuli are those other stimuli that influence the situation. Residual stimuli including the individual’s beliefs or attitudes that may influence the situation. Adaptation occurs when the total stimuli fall within the individual’s/family’s adaptive capacity, or zone of adaptation.

The four adaptive modes in this model provide form or manifestations of cognator and regulator activity. Responses to stimuli are carried out through these four modes, they are: physiologic, self-concept, interdependence and role function. The physical mode covers basic needs, such as eating, sleeping and protecting the body. Self-concept refers to an individual's beliefs and feelings about him or herself. Role function mode, involves the perception of where the individual fits in the social network, how he or she relates to other people and should behave towards them. Interdependence mode, refers to the personal relationships he or she has with friends, family and life partners.
When the inputs are favorable, the adaptive level is high and enhances the optimum health in an individual. If it is not a favorable stimuli, it leads to maladaptive response where in there is a constant friction between stimuli and the environment. It leads to intensity, which causes the morbidity and mortality to the mother and foetus/newborn.

Nurses play a vital role in bringing positive external stimuli to enhance the optimal health of an individual. The nurses direct the ways to adapt to environment which reduces sickness behaviors. Theorists insist that nurses play a different role in influencing the external stimuli in performing various nursing interventions which include CAM and providing health education to the individuals.

For the current study identifies, primigravidae the stress and anxiety developed due to internal and external stimuli. The seven individual variables are considered as stimuli in the study. The stimuli include age, education, location, education, type of family, nature of work, income and source of health information. The stimuli also include socio-psychoeconomic aspects such as support from the husband, family members, friends, understanding between partners, feeling of cared and respected, physical, verbal and sexual abuse by the spouse, and substance abuse from the spouse such as alcohol, smoking, economic dependency and commitment of the primigravidae.

These stimuli are assessed along with the stress and anxiety of primigravidae. In the internal stimuli, the perception about pregnancy, delivery and health of the foetus, implicitly influence the health of the mother and foetus/newborn in two groups, the study and the control groups.
External stimuli or acquired mechanism is progressive muscle relaxation installed for ten weeks only to the study group. Progressive muscle relaxation being a mind body intervention is input to develop and strengthen control process in the way primigravidae’s coping mechanism will help cognator and regulator and influence the four modes of effectors. During the study period, primigravidae were reinforced every week through the phone and direct reinforcement was given during each visit to antenatal out patient department for a regular check up.

After regular practice of progressive muscle relaxation the primigravidae in the study group experienced energetic, improved sleep, appropriate weight gain, tolerance to minor discomforts that in turn causes increased gestational age at birth, enhances normal delivery, APGAR score and birth weight of newborn and lessen the maternal and foetus/newborn complications and postpartum depression among primigravidae are some of the physiological function mode.

The self concept including fear, stress, anxiety about change of the health of herself and foetus, fear of delivery, care of newborn will be alleviated leading to improved confidence, assertiveness empowerments as interdependence leading to a level of adaptation. These levels can form the base for role function.

The role functions are well understood by primigravidae leading to one adaptive measure as coming for regular check up, monitoring for the complications. These adaptive levels on reaching peak bring the highest possible optimum health to the mother and foetus/newborn, which in turn optimizes the interdependence such as stable personal relationship with partner, family member and coping with her responsibilities and discomfort.
The outcome measurement with stress based on Calvin Hobel scale for pregnancy specific stress and anxiety by STAI clarifies the findings along with pregnancy outcome. The measurement which includes minimal, mild and moderate level of stress, anxiety as mild moderate and severe and pregnancy outcome as gestational age at birth, mode of delivery, APGAR score, birth weight of newborn, maternal, foetus/newborn complications, postpartum depression among primigravidae.

The primigravidae with stress and anxiety who expressed maladjustment behaviors and who didn’t have any external stimulus such as progressive muscle relaxation felt the same or increase level of stress and anxiety as pregnancy progresses and had poor pregnancy outcome. Whereas women in the study group were given video assisted teaching felt decrease level of stress and anxiety as pregnancy progresses and had good pregnancy outcome. The routine care were given to the both groups which includes care provided by health care professionals.
Background variables
Age, education, location, type of family, nature of the work, income and source of health information.

Primigravidae with stress and anxiety at 21-22 weeks of GA

Socio-psychoeconomic variables.
Social support, psychological variable, Abuse, substance abuse by spouse, economic variable

**Study group**
- Video assisted teaching on progressive muscle relaxation on one-to-one basis for 2 consecutive days
- Self practice at home daily once 10 weeks with help of audio CD/cassette.
- Routine care

**Control group**
Routine care

**CONTROL PROCESS**
Weekly telephonic reinforcement. Direct reinforcement regular checkup in ANOPD

**INPUT**

**CONTROL PROCESS**

**CONTROL PROCESS**

**EFFECTORS**
- Physiological
  - Improved sleep
  - Normal weight gain
  - Tolerance to discomfort
- Role function
  - Regular check up monitoring for self and foetal wellbeing
- Self concept
  - Reduced stress and anxiety
  - Interdependence
    - Coping with responsibilities

**OUTPUT**
- Increased Incidence of
  - Preterm labour
  - Low APGAR score & birth weight.
  - Maternal, foetus/newborn complications
  - Postpartum depression

- Normal Incidence of
  - Term, normal delivery
  - Normal APGAR, birth weight.
  - Fewer maternal, foetus/newborn complications
  - Less incidence of postpartum depression.

**Figure 1. Conceptual framework based on Roy’s Adaptation Model (1976)**