



# A Direct Test Of Diathesis- Stress Model On A Mother With Down Syndrome Child

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## 1.1 Introduction

The Diathesis- stress model of psychopathology was developed by psychologist Rosenthal and Bleuler in 1960. The Diathesis stress model explains how the biological factors, the genetic factors (nature) and the environmental stressors such as the social and familial factors (nurture) can trigger a mental disorder. Stress has been identified not only as a phenomenon but as the major component of the model that can activate a diathesis.

According to Rosenthal (1963) there is an interaction between the genetics and the environment. Diathesis is synonymous with the word vulnerability and according to Ingram et

.al;( 1998), diathesis is a trait which is stable and latent but can change when certain stress is encountered.

The model explains stress can facilitate the development of a mental disorder.

Stronger the diathesis, lesser the stress is required to activate the diathesis resulting in a mental disorder (Zuckerman .M 1999); (figure 1. Heuristic approach to diathesis model. ( Gazzaniga & Halpern 2013.)

The Diathesis -Stress model is also known as the Stress -Vulnerability model. The model explains what is the relation between stress and the development of a psychopathology (Quaedflieg and Smeets, 2013)

(1) cause-and-effect relationship between stress and the development of a psychopathology and the role of stress in triggering the latent vulnerability factors.

Stress has been identified as the main etiological factor and the main component of the model that can trigger a mental disorder. Initially the model was developed to explain the causes of mental disorders -- Schizophrenia and Depression.

(2). The model also explains the role of the environmental stressors such as adverse life experiences of childhood sexual abuse, physical abuse, death of loved one, having a family member into alcohol and drugs or confined in the jail, domestic violence, prenatal and postnatal challenges; family history of mental illness; organic mental disorders are the factors that can intensify and amplify the mental illness in an organism especially the ones who already have a preexisting vulnerability.

(3) Role of the protective factors and how being resilient can buffer or moderate the impact of stress and lower the probability of developing a mental illness.

Scientific research has confirmed that stress can activate the Hypothalamus -Pituitary -Adrenal(HPA) axis resulting in the production of the glucocorticoids. These glucocorticoids have found to have easy access to the brain, influencing the brain and the behaviour and a close relationship between stress and the reduction in the volume of the hippocampus (*Lupien et al., 2009*)

## 1.2 Aim of the study

The aim of the study is to conduct a direct test of diathesis- stress model on the mother of a 5-year-old son suffering from Down Syndrome. The study makes an attempt to examine whether the birth of the baby with Down Syndrome can activate a diathesis in the mother

## 1.3 Research gap

The study had certain research gaps: \_

- i. A longitudinal method of study would have been appropriate which requires observation over an extended period of time.
- ii. In addition, Hans Selye's General Adaptation Syndrome model could have been applied to the study, which explains the generalized effort of the individual to the new conditions and how an abnormal adaptation &

response to the new stressful situation can lead to a pathogenesis of syndromes and diseases .and the phases of alarm, resistance and exhaustion could have better explained the mothers psychophysiological changes ( aggressive attack or the fearful escape both circumstances leading to the activation of the HPA axis each time ) with each time her child suffers in the daily routine life.

- iii. The study could not be conducted in a safe and comfortable environment the work place was noisy with disruptions and interruptions.

## 1.4 Literature Review

There is substantial evidence about the effects of psychosocial stressors on schizophrenia. and the biological correlates .Initially diathesis-stress model was developed to explain the etiology of schizophrenia and depression .Recent research has been conducted and according to the neural diathesis stress model , explains that stress acts upon the preexisting vulnerability to worsen the symptoms of schizophrenia and leads to the activation of the HPA axis due the release of the cortisol .The research data also indicates that activation of the HPA axis brings about an abnormality in the Dopamine synthesis and receptors and damage of the hippocampus brain region making the patient hypersensitive to stress( *Walker, E. F., & Diforio, D. (1997)*)

The model was developed by psychologists David Rosenthal and Manfred Bleuler in 1960s to explain the causes of Schizophrenia. Later the model was used to explain the causes of mental disorders such as depression and anxiety in 1980s. The model gives explanation that the abnormal behaviour is the result of biological and genetic vulnerability. The word diathesis is a Greek word and synonymous with vulnerability. Several models and theories of stress have examined the role of stress in increasing the mental illness and developing into a mental disorder when the person is unable to cope, not able to manage the chronic stress and not able to find a solution to the conflicting situations.

There is substantial evidence from the literature review that proves that stress plays a crucial role in activating a diathesis. One approach can be linked to the environmental demands or the stressful life events resulting in negative emotional responses , activation of the HPA -axis, poor health resulting in physical illness and ultimately risk for the onset of the disease or progression of the disease ( *Cohen et al ., 1995* ) .*Hans Selye (1956)* Hans Selye was the first endocrinologist to give a scientific explanation to biological stress and

showed that there is link between stress and mental illness .A stressful condition can result in the activation of theHypothalamus-pituitary -adrenal axis .Many psychiatric disorders have been associated with the activation of the HPA axis ,especially the Major depressive disorder . Studies show that inMelancholic depression patients, there is excessive secretion of the stress hormone cortisol, activation of the HPA-axis which suppresses the immune system. Depression is associated with high levels of cortisol (*Altemus & Gold, 1990; Stokes, 1995*). A prolonged stress can result in inflammation and pain. Clinical studies reveal that stress can also lead to the shrinkage of the hippocampus and activation of the HPA axis (*Cullen and Walker 1997*).

Studies have shown that there is a link between environmental stressors and psychopathology,children who have suffered maltreatment have shown alteration of the dopamine system (*Dillon et al 2009*) and the risk of psychosis in adulthood (*Howes et al 2004; Thompson et.al 2004*)

Early life adversities show impairment both in the rhesus monkeys and the human brain mainlythe sensitive brain regions of prefrontal cortex (*Anda et .al, 2010, Felitti et. al ,1998*) The human brain showed smaller brain volumes in the prefrontal cortex, greater activation of the HPA axis and increased levels of inflammation in the maltreated children and adults with a history of childhood maltreatment (*Danese and McEwen 2012*); smaller gray matter volume (*Ansell et. al 2012*)

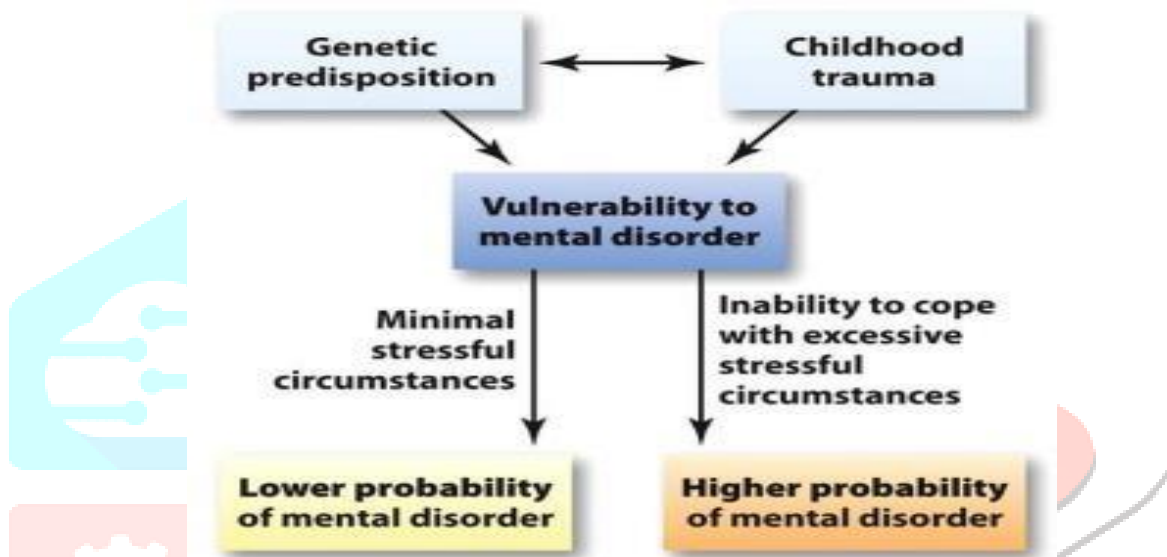
Research also shows that people living in a chaotic and stressful environment with daily hasslesimpairs the self-regulatory behaviours resulting in increased blood pressure (*Evan et .al, 2005; Evans and Wachs 2010*).

Clinical studies have pointed out the that stress effects the brain plasticity (*Bezzola et al,2011*). Research shows that repeated 21 days of chronic stress changesthe functions and structure of the brain regions such as the amygdala, hippocampus and the Prefrontal cortex (*McEwen & Gianaros 2011*), further reducing the dendrite growth of the neurons (*Vyas et.al,2002*)

Acute stress exposure can trigger an illness in vulnerable individuals, and this is well supportedby one of the studies that showed that the NATO bombing campaigns which took place duringthe Kosovo war in 1999, were associated with the onset of psychosis in the immigrant patients(*Zolkowska, Cantor-Graae and McNeil*.) According to a retrospective study conducted in 2017-2018 showed that stress can trigger psychiatric

disorders such as psychosis spectrum disorders, anxiety and mood disorders especially in people who have low stress tolerance. The study conducted on the military soldiers just after two months of their recruitment showed early onset of schizophrenic spectrum disorder with an increase of 53% of hospitalization due to exposed stress of military services (Chasiropoulou, Ch et. al, 2019)

**Fig.1.1 Heuristic approach to diathesis stress model**  
*Source from Gazzaniga & Halpern 2013*



*Figure 1: Gazzaniga & Halpern, 2013*

Both nature and nurture effects the human behaviour. The individual’s genetic component together with the people who are around us both influence the individual’s psychological well-being which can be said to be the gene-environment interaction. (Diamond 2009; Lobo & Shaw2008)

It is also believed that it not only the interaction between the gene and the environment but the two are correlated (Rende & Plomin 1992). The persons behaviour is also formed due to his or her own genetic makeup (Plomin 2018). Hence it is not only the nature and the nurture solely responsible for the persons behaviour an interaction between the two that results in the behaviour.

## 2. Project outline-proposed study & methods

### 2.1. Methodology

The study is based on a cross sectional qualitative method of collecting the data. The data was collected at a given point in time (October 2020 -December 2020) Most of the interactions & observations related to the study with the respondent was conducted within the premises of her workplace.

Respondents other characteristics were taken into consideration such as the age, sex, marital status, employment and the financial status. A short survey was conducted on the respondent whereby the respondent was asked to self-rate herself on the questionnaires. The questionnaires were related to stress, anxiety and depression. The study used the predesigned psychometric scales already tested for their reliability and validity coefficient, as the primary method of data collection from the respondent. The scores were obtained as per the instructions of the scales.

There were three psychometric sales used in the study (*See Annex D 1, D2, D3 p32,33,34*)

- i. The Perceived Stress Scale (PSS)
- ii. Hamilton Anxiety Rating Scale (HAM-A)
- iii. Depression Anxiety and Stress Scale (DASS-21)

Time spent with the respondent was of total duration 90 hours. The study was initiated on the 14th October 2020 till 31st October 2020, 2 hours per day at the school premises where the respondent works and 14th Nov till 31st December 2020, 1 hour per day with face-to-face sessions, emails and telephonic interactions (*see Annex F {Call Log Table 1.1}*)

*Details of the Call Log Table 1.1*

| Date                                      | Month        | Hours          | Mode of Interaction   |
|---|--------------|----------------|-----------------------|
| 14,15,16,19,20,21,22,23,26,27,28,29,30,31 | October 2020 | 2hours per day | Face to face          |
| 17,18,24,25 (Weekends)                    | October 2020 | 2hours per day | Telephonic and emails |

| Date  | Month                    | Hours          | Mode of interaction                              |
|---|--------------------------|----------------|--|
| 14 <sup>th</sup> November till 31 <sup>st</sup> December 2020 | November & December 2020 | 1 hour per day | Face to face, emails and telephonic interactions |

The subject was asked to sign the ethical clearance form after reading and accepting the conditions on a voluntary basis. (see Annex C {p 31})

**2.2. Hypothesis**

The study is based on the research question -

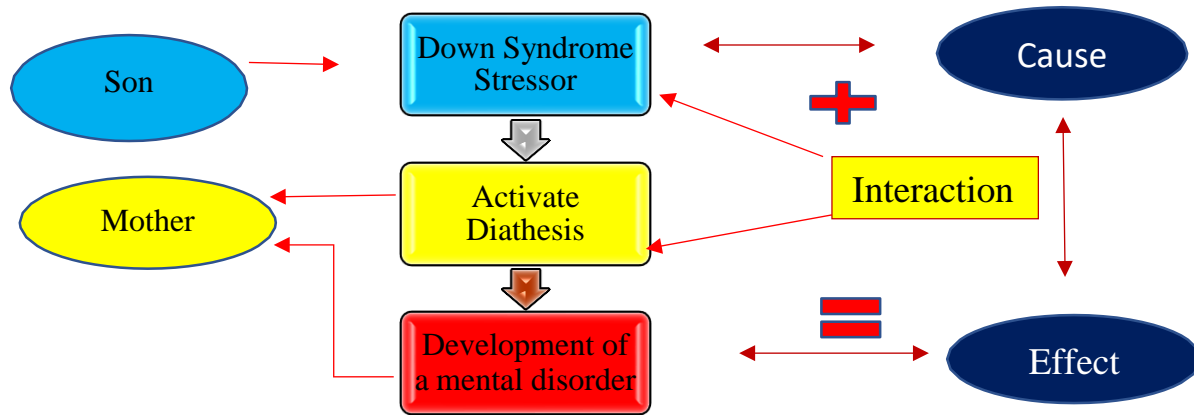
1. The birth of the child with down syndrome is a major psychosocial stressor (**cause**)

And

2. The child may activate a diathesis in the mother, facilitating the development of a psychopathology. (**effect**)

The same can be explained by a way of a flow chart below. (figure 1.2. Flow Chart)

Fig 1.2 Flow Chart to show Relationship between Stressor, Diathesis & Mental Disorder



**Instrument Design & Data Collection**

**2.3. Instrument Design**

The research used three psychometric scales. These scales are predesigned and have psychometric property and are established with reliability and validity. Following scales were used:

**i. Perceived Stress Scales (PSS)**

The scale was designed by psychologist Dr. Sheldon Cohen and colleagues in 1983. The scale is a 5-point Likert scale ranging from 0 to 4. The scale measures how the individual perceives his/her stress. The scale contains 10 questionnaires where the person is asked about their feelings and thoughts during the last month (for example, in the last month, how often have you felt nervous and “stressed”?)

**PSS Scoring Table 1.2**

|       |              |           |              |            |
|-------|--------------|-----------|--------------|------------|
| 0     | 1            | 2         | 3            | 4          |
| Never | Almost never | sometimes | Fairly often | Very often |

The PSS scores are obtained by reversing the responses to the question’s numbers 4,5,7 & 8 (positively stated questions) for example 0=4,1=3,2=2,3=1,4=0 and then adding the total scores for all the ten items. Total perceived stress: Sum Items :1,2,3,4R,5R,6,7R,8R,9,10

A higher PSS score suggests greater vulnerability to stress.



ii. **Hamilton Anxiety Rating Scale (HAM-A)**

The Hamilton Anxiety rating scale is a 5-point Likert scale ranging from 0-4 (*See to Table 1.3*) is a 14-item scale and measures the severity of anxiety symptoms. The scale measures mental agitation, psychological distress (psychic anxiety) and physical complaints related to anxiety (somatic anxiety) where score lesser than 17 indicates mild severity, a score between 18-24 indicates mild to moderate and a score between 25-30 from moderate to severe. ***This is a clinician rated scale***

**Table 1.3 The scoring of the items HAM-A**

|             |      |          |        |             |
|-------------|------|----------|--------|-------------|
| 0           | 1    | 2        | 3      | 4           |
| Not Present | Mild | Moderate | Severe | Very severe |

iii. **Depression Anxiety Stress Scales (DASS-21)**

The scale was developed by Lovibond and Lovibond 1995 (Beaufort et al., 2017) is 4-point Likert scale ranging from 0 to 3 (*See Table 1.4*) The subject has to self-rate themselves as to how they have experienced themselves over the past week. The DASS- 21 scale has 7 items per subscale – depression, anxiety and stress. It is well established instrument to measure symptoms of depression, anxiety and stress in both clinical and non-clinical samples of adults. The original 42 item DASS of Lovibond was modified into a shorter 21 item version. The questionnaires for example “I felt that the life was meaningless” “I felt I wasn’t worth much as a person “assess the devaluation of life, feelings of hopelessness and self-depreciation under the depression subscales, and other questions dealing to assess the level of anxiety and stress.

**Table 1.4 Rating Scale DASS 21**

|                            |                            |                                       |                        |
|----------------------------|----------------------------|---------------------------------------|------------------------|
| 0= never (N)               | 1 = Sometimes (S)          | 2 = Often (O)                         | 3 = Almost always (AA) |
| Did not apply to me at all | Apply to me to some degree | Apply to me to a considerable degree) | Apply to me very much  |

Each subscale is calculated by adding the scores. And then referred to the scoring to match the results as in table 1.4

**Table 1.5**      *Scoring of DASS 21*

|                         | Depression | Anxiety | Stress  |
|-------------------------|------------|---------|---------|
| <b>Normal</b>           | 0 - 4      | 0 - 3   | 0 - 7   |
| <b>Mild</b>             | 5 - 6      | 4 - 5   | 8 - 9   |
| <b>Moderate</b>         | 7 - 10     | 6 - 7   | 10 - 12 |
| <b>Severe</b>           | 11 - 13    | 8 - 9   | 13 - 16 |
| <b>Extremely Severe</b> | 14 +       | 10 +    | 17 +    |

A score of more 14+; 10 + and 17 + on a subscale of depression, anxiety and stress indicates extremely severe symptoms of depression, anxiety and stress

### ***Data Collection***

The data was collected from the respondent with the help of three psychometric scales. Two scales namely the Perceived Stress Scale (PSS) and the DASS -21 were self-rating scales for the respondent, administered through the questionnaires and the third scale the Hamilton Anxiety Rating Scale (HAM-A) for anxiety was clinician rated scale.

### ***2.4. Data Analysis***

The data was analyzed by obtaining the scores and then summing the scores of the responses, as per the instructions given by the psychometric scales. Special instructions were followed for the reverse scoring for the four positively stated items of the PSS (items, 4, 5, 7 & 8)

### ***2.5. Ethical consideration***

The participation of the respondent was voluntary and a written consent was obtained from the respondent. The respondent was given the assurance for retaining the confidentiality such as the name, employment and other personal details. The respondent was informed that the study is not being conducted for any clinical diagnosis and intervention. Considering the study being low risk, no application for approval was submitted to the supervisor or to the school authority. (See Annex C{ p 31} )

## 2.6. *Limitation of the study*

The study met with few limitations. The first limitation being that the majority of the interaction and observations had to take place within the school premises and it was not much conducive to carry out the study. The environment was full of distractions

The second limitation was that the respondent could have answered the self-report measures in a socially acceptable manner due to the demand of the society, fear of revealing the facts actual signs and symptoms, embarrassment and there is no way to check the accuracy of the answers. Hence there is probability that the respondent could have answered most of the questions of the survey with hesitations. The scores entirely depend on how sincerely the questionnaires have been answered. Third limitation is that the study was more of a semi longitudinal method where the interaction and observations with the subject took place over few weeks' time. For better outcome and interpretations of the results, an observation of the respondent for an extended period of time would have been much suitable for the study.

## 3. **Findings and Discussions**

### 3.1. *Findings*

Figures 1.1 and 1.2 indicates a clear dose relationship between stress and the development of the mental disorders. A person can be at high risk of developing a mental disorder who have a history of preexisting vulnerabilities. The present pilot study is an attempt to establish and prove the hypothesis that the environmental stressors can predispose a person towards the development of a mental illness. An attempt has been made to examine if there is a clear dose relationship between the mother who is the respondent for the present case study and the birth of the child with down syndrome considered to be the cause of constant and excessive stress, worries, daily hassles in life, due to which the mother's mental well-being could be at a risk of developing a mental disorder.

The study was conducted between the month of October 2020 and December 2020.

Three psychometric scales (1) The Perceived Stress Scale (PSS) (2) The Hamilton Anxiety rating Scale (HAM) (3) DASS 21 were used on the respondent and the respondent was asked to self-rate herself by answering the questionnaires.

## Results

The Results obtained are as below:

**The Perceived Stress Scale-** The responses for question 4,5,7 and 8 were reversed scored (*Seetable 1.6*) and then the total score for all the 10 items were added.1,2,3, R4, R5,6, R7, R8,9,10The respondent scored a total of 32 which indicated greater vulnerability to stressful life event-elicited depressive symptoms and more cold (low immune system) as indicated by the Scale (**See Annex D 1and D.1 {p 32}** )

**Table 1.6 Reverse scoring PSS (for Q4,5,7,8)**

| <i>Questions</i> |  | <i>Respondents responses</i> | <i>Reverse Scoring</i> |
|------------------|--|------------------------------|------------------------|
| 4                | In the last month, how often have you felt confident about your ability to handle your personal problems | 1=almost never               | 3=fairly often         |
| 5                | In the last month, how often have you felt that things were going your way?                              | 1=almost never               | 3=fairly often         |
| 7                | In the last month how often have you been able to control irritations in your life?                      | 1=almost never               | 3=fairly often         |
| 8                | In the last month, how often have you felt that you were on top of things?                               | 2=sometimes                  | 2=sometimes            |

### **The Hamilton Anxiety Rating Scale (HAM-A)**

The respondent's **behaviour was observed** during the marking of the questionnaires. Questions were asked and the respondent scored a total of 27 scores on the 5-point Likert scale ranging from 0 to 4 indicating that the respondent suffers from moderate to severe mental agitation, psychological distress and physical complaints.

(**See Annex D2 and D.2 {p 33}**)

**DASS 21**

The Scores of the respondent for each subscale such as Depression, Anxiety and Stress were relatively high and indicated that the respondent had been experiencing high levels of disturbances and is at a high risk of developing further problems. (See table 1.7 for the results)

**Table 1.7 Respondents Scores on DASS 21**

| Depression Score | Anxiety Score | Stress Score |
|------------------|---------------|--------------|
| 11               | 14            | 19           |

The respondent scored a total of 11 on the subscale of Depression indicating severe symptoms of Depression, a score of 14 on the subscale of Anxiety indicating extremely severe symptoms of Anxiety and a score of 19 on the subscale of Stress indicating that the respondent has extremely severe symptoms of Stress. (See Appendix D3 and D.3 {p 34})

The results obtained are in line with the hypothesis and indicate that the respondent has been experiencing symptoms of stress, anxiety and depressed mood since the past week and since last month.

### 3.2. Discussions (Case Conceptualization)

Mrs. X is a 36-year-old Educator who works in the state secondary school in Mauritius. Her husband is also an educator. Mrs. X has two children aged 9 and 5 years old. Mrs. X has no prior history of medical or mental illness herself or in the family to the best of her knowledge. Mrs. X narrates her experience of being a mother of 5-year-old child with Down Syndrome as follows:

#### 1) Case Conceptualization- Verbatim report of all sessions

“It was a love marriage. I have a loving husband and my husband is caring and loving father to the children. My younger son was born in the year 2015 with down syndrome and had three holes in the heart. During the echography of my pregnancy, the doctor found that the baby has a down syndrome. The baby was born with

down syndrome. I could not hold the baby in my arms just after the delivery, for two months because he was in the ICU. I felt a lot of anger. Now my son is 5 years old and I am always in continuous anxiety, what will happen to the baby & what he will do. When my child was born the hospital, staff commented that it is not wise to invest in such a baby and treating him overseas. I took a loan of Rs 20,00,000 for my baby's treatment in India and I got him operated for the threeholes in the heart. I am still repaying the loan for the last 4 years. He still has low immunity, is always on antibiotics due to frequent fever. My life has been a continuous struggle to look for a special school & not every school accepts his admission because he has learning disability as well and he cannot express himself, sometimes he gets very violent. They want a child who has some IQ and can speak sentences. When I'm not occupied with work at school, I only think about my son. I have started feeling palpitations since this year especially whenever my son gets ill, I get palpitation which lasts for a few minutes. "My mother-in-law blames me for the abnormal pregnancy and I don't have support from them. The ministry provides invalidity pension and carer allowance but it's not sufficient for the child. I'm constantly worried, who will take care of my son after I am gone. I feel the future of my son is dark." "One day my son fainted, at that time I felt nausea and my hands and feet were cold and numb. On another occasion when my son was admitted in the hospital for 5 days, I was so much under stress that I had lost weight. And on another occasion, I was informed by the doctor that my son's thyroid had increased which could affect other organs, I panicked & I felt increase in my heart beat."

## 2) *Identification of the problem*

The respondent has a son aged 5 years who is suffering the down syndrome. The study rules out any childhood adversity of the respondent as well as any history of medical and mental illness as she has not given negative feedback on such details as family violence or parental divorce or any family psychopathology such as depression or anxiety as disorders in the family which might have otherwise contributed to the present situation as previous existing depressive experiences. Previous depressive experiences can change the neurobiological sensitivity to stress (Post 1992).

The present study shows that the effects for the total stress were accounted for the medical (genetic) because of the condition of her child since birth and that this stress has accumulated over the years as “excessive & prolonged stress” The mother experiences feelings of helplessness and that here is no hope because the condition (down syndrome) will not change as the medical condition has no cure.

It can be estimated that the present chronic stressful conditions can have an easy transition in the later years of her life. Birth of the child with down syndrome is a stressful life event (SLE) and is an important cause for early signs and symptoms of depression, anxiety.

### 3) *Protective factors*

Support from the husband and the work of the respondent can be said to be the protective factors which help her to maintain the social networks and high self-esteem and buffer the effects of stress.

### 4) *Risk factors*

The continuous and never-ending hardships faced by the respondent are the high-risk factors for her to develop physical and mental health illness. Being the primary care giver, the respondent is more prone to exhaustion and stress.

## 4. Conclusion & Recommendations

### 4.1. *Conclusion*

The present study demonstrated that the main cause of stress is the Down Syndrome of the child since birth. The findings and the results obtained from the psychometric scales indicate that the respondent is exhibiting symptoms of stress, anxiety and depression ranging from severe to extremely severe. Though the scales used are not for clinical diagnosis and intervention, it can only be speculated that the respondent is suffering from psychological distress caused by the child's medical condition and is the major psychosocial stressor. The child's condition can affect the threshold and the stress can activate & precipitate a future mental illness. The case study is in agreement with the diathesis stress model of psychopathology and was successful in proving the hypothesis of the study.

#### 4.2. Recommendations

Though the findings are in the line with the diathesis stress model that stress being the main component of the model can activate the diathesis. With the present case study, we have taken only the environmental stressors into considerations, though more research is required in this direction. Though the diathesis stress model emphasizes that the latent diathesis in the context of a preexisting mental disorder which is latent can be fully activated in the presence of a chronic and repeated stress. Also, it is not necessary that if there is a preexisting vulnerability, the person will develop a mental illness. Other factors such as protective factors, resilience, persons personality type, coping mechanism of the person etc. can buffer the effects of stress and lower the probability of the mental illness.

For a better outcome it is important to conduct the study in a longitudinal set up and a detailed history of all the variables that could impact the development of a diathesis.

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