Cognitive Ability of an Individual as Outcome of Preterm and Full Term Birth

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Abstract
The purpose behind this investigation is to see whether the cognitive ability of an individual is the outcome of Nature of Birth i.e. Preterm and Full term, for this investigation Purposive randomized sampling technique was employed to select the participants, sample consist of 120 adolescents, in which birth of 60 adolescents was preterm, and birth of another 60 adolescents was full term, both groups from adolescents those birth were preterm and adolescents those birth were full-term were equally classified in male and female. Cognitive ability of the individual was determined on the basis of assessment of the ability to sort information from his or her environment and selectively react to this information of Adolescents’ with the help of score obtained by Stroop Colour and Word test standardized by Charles J. Golden. Since, the proposed statistical analysis mainly consisted of descriptive and Structural Equation Modelling (SEM) Using AMOS. The result obtained through the study showed that Nature of Birth i.e. Preterm Birth and Full Term Birth is the significant predictor of cognitive ability of an individual. Gender is the significant predictor of cognitive ability of an individual.

Key words: Cognitive ability, Preterm Birth, Full Term Birth.

1. Introduction
On the off chance that anybody’s infant is conceived too soon, the wonder of birth may be eclipsed by worry about their preemie’s wellbeing and the conceivable long haul impacts of rashness. Notwithstanding, there’s much guardians can do to deal with your untimely child and their self as they look toward what’s to come. Birth brain research is a creating discipline worried about the mental effect of the birth understanding and related
stages on the person for the duration of their life, on identity, psychological well-being, conduct, and physical, passionate, subjective, social and social advancement for the tyke, from early stages through adulthood. In people, preterm birth is the introduction of a child of under 37 weeks gestational age. The reason for preterm birth is by and large tricky and obscure; numerous variables give off an impression of being related with the improvement of preterm birth, influencing the decrease of preterm to birth a testing recommendation. Untimely, birth is characterized either as the same as preterm birth or the introduction of a child before the creating organs are develop enough to permit typical postnatal survival. Untimely babies are at more serious hazard for short and long haul inconveniences, incorporating inabilities and obstacles in development and mental improvement. Huge advance has been made being taken care of by untimely newborn children, yet not in lessen the predominance of preterm birth [1].

In people, the standard meaning of preterm birth will be birth before a gestational age of 37 finished weeks. In the ordinary human baby, a few organ frameworks develop in the vicinity of 34 and 37 weeks, and the hatchling achieves satisfactory development before the finish of this period. One of the principle organs incredibly influenced by untimely birth is the lungs. The lungs are one of the last organs to develop in the womb; along these lines, numerous untimely infants spend the principal days/long stretches of their life on a ventilator. Along these lines, a noteworthy cover exists between preterm birth and rashness. By and large, preterm babies are untimely and term babies are developed. Preterm babies conceived close to 37 weeks regularly have no issues identifying with rashness if their lungs have created satisfactory surfactant, which enables the lungs to stay extended between breaths. Screech of rashness can be decreased to a little degree by utilizing medications to quicken development of the embryo and to a more noteworthy degree by avoiding preterm birth.

An untimely birth is a birth that happens over three weeks previously the infant is expected-as such, after under 37 weeks of pregnancy, which as a rule keeps going around 40 weeks. Untimely birth gives the infant less time to create in the womb. Untimely children, particularly those conceived most punctual, frequently have confused therapeutic issues [2].

Depending on how early a baby is born, he or she may be:

- **Late Preterm**: Born between 34 and 37 weeks of pregnancy.
- **Very Preterm**: Born at less than 32 weeks of pregnancy.
- **Extremely Preterm**: Born at less than 25 weeks of pregnancy.

### 1.1. Cognitive Ability

Cognitive ability portrays how the individual obtains learning (cognizance) and procedures data (conceptualization). Subjective styles are identified with mental practices which people apply constantly when they are taking care of issues. All in all, they influence the manner by which data is gotten, arranged, and used. Intellectual style is normally depicted as a steady and constant identity measurement which impacts states of mind, qualities, and social collaboration. It is a normal for subjective handling which is specific to someone in particular or class of people. There are a wide range of meanings of psychological style. Tennant characterized intellectual styles as "a person’s trademark and steady way to deal with arranging and preparing data" [3]. Riding, Glass, and Douglas named intellectual styles as "a genuinely settled normal for an individual" and "are
static and are moderately in-fabricated highlights of the person”. In view of the above definitions, in the creators' perspectives, intellectual/learning styles allude to the person's steady and trademark inclinations of seeing, recollecting, sorting out, handling, considering, and critical thinking [4].

Vohr and team announced the neurodevelopmental, neurosensory, and practical results of 1151 greatly low birth weight (401– 1000 gm) survivors tended to in the 12 partaking focuses of the National Institute of Child Health and Human Development Neonatal Research Network, and to recognize medicinal, social, and ecological variables related with these results [5]. Neurologic, formative, neurosensory, and practical morbidities expanded with diminishing birth weight. Factors fundamentally connected with expanded neurodevelopmental bleakness includes endless lung malady, grades 3 to 4 intraventricular discharge/periventricular leukomalacia, steroids for unending lung sickness, necrotizing enterocolitis, and male sexual orientation. Factors fundamentally connected with diminished dreariness include expanded birth weight, female sexual orientation, higher maternal instruction, and white race. ELBW newborn children are at critical danger of neurologic variations from the norm, formative postponements, and practical deferrals at 18 to 22 months' revised age [6].

Stjernqvist and team led concentrate to assess the circumstance of to extremely preterm (EPT) youngsters at school, contrasted and that of full-term (FT) control kids, at 10 years old. Wellbeing, intellectual advancement, school accomplishment and conduct were estimated. Ninety-two percent of the preterm kids had no major neurological handicap and most were healthy. On the two tests the contrasts between the gatherings compared to roughly one standard deviation. Thirty-eight percent of the EPT youngsters performed underneath grade level at school. Thirty-two percent had general conduct issues and 20% had consideration deficiency hyperactivity issue, contrasted and 10% and 8%, separately, in the FT gathering. EPT children require interventions to support their development and reduce behavioural problems.

Johnson published a survey of the psychological and social results of extremely preterm youngsters in center youth. Case-controlled investigations have demonstrated that very preterm kids have knowledge remainder (IQ) scores fundamentally lower than term peers, notwithstanding for the individuals who are free of extreme incapacity. Creators have noticed a gestational age-related angle in IQ for those conceived previously 33 weeks and studies have uncovered specific issues in non-verbal thinking and concurrent data handling. Extremely preterm youngsters are likewise in danger for social issues. There is little agreement in regards to the nearness of disguising or externalizing practices, however most investigations demonstrate an expanded danger of attentional and social issues. Studies have likewise demonstrated a more prominent predominance of mental issue and, particularly, an expanded hazard for ADHD. Methodological issues are examined and recommendations are made for enhancing the revealing of results to encourage cross-contemplate examinations [8].

Matthew and team investigated that very preterm birth (VPT; <33 weeks' development) is related with later neuromotor and intellectual debilitation, lessened school execution, and mental horribleness. A few follow-up thinks about have shown expanded nervousness and social dismissal and diminished confidence in preterm youngsters and adolescentss, however few examinations have inspected the impacts of preterm birth on grown-
up identity. They evaluated 108 VPT people and 67 term-conceived controls at ages 18 to 19 years with the Eysenck Personality Questionnaire-Revised, short frame (EPQ-RS). This poll rates 3 measurements of identity: extraversion (amiability, enthusiasm, sensation chasing); neuroticism (uneasiness, low inclination, low confidence); and psychoticism (chilliness, hostility, inclination to standoffish conduct). A fourth scale, "lie," which measures dissimulation, is additionally inferred. At last it is inferred that Young grown-ups who are conceived VPT have distinctive identity styles from their term-conceived peers. This might be related with an expanded danger of mental challenges [9].

2. Methodology

2.1. Research Objectives

1. The purpose of this study was to determine whether the cognitive ability of an individual is the outcome of Nature of Birth i.e. Preterm or Full term.
2. To find out whether there is individual difference in terms of preterm and full term birth.

2.1.1. Research Hypotheses

1. Nature of the birth i.e. preterm and full term birth is significant predictor of cognitive ability among individual.
2. Gender i.e. male and female was significant predictor of cognitive ability among the individuals.

2.2. Participants (Sample)

Sample of the present investigation was confined from the population of the Maharashtra State. Effective sample was consist of 120 adolescents, in which birth of 60 adolescents was preterm, and birth of another 60 adolescents was full term, both groups from adolescents those birth were preterm and adolescents those birth were full-term were equally classified in male and female (Table 1). The purposive randomized sampling was considered. The efforts was made to have the sample as representative as possible in terms of area of living, education. All the subjects will be from similar kind of socio-economic status.

Table 1. Distribution of the effective sample.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Adolescents those birth were preterm</th>
<th>Adolescents those birth were full term</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td>N = 120</td>
</tr>
</tbody>
</table>

2.3. Variables

1. Nature of Birth i.e. Adolescents those birth were preterm & Adolescents those birth were full-term, and Gender are independent variables in this study.
2. Cognitive ability is dependent variables in this study.

2.4. Research Design

Following Design Model was used to study the cognitive ability of an individual as outcome of Preterm and Full Term Birth.

- Regression Weights
Means of exogenous variables
- Intercepts for predicting endogenous variables
- Variances of exogenous variables

2.5. Operational Definitions of Variables

2.5.1. Cognitive Ability
Cognitive Ability of the individual was determined on the basis of assessment of the ability to sort information from his or her environment and selectively react to this information of Adolescents’ with the help of score obtained by Stroop Colour and Word test standardized by Charles J. Golden [10].

2.5.2. Preterm Birth
Adolescents who were born prior to 32 weeks after conception, i.e., maximum 32 weeks gestational age will be considered as preterm birth adolescents.

2.5.3. Full-term Birth
Adolescents who were born after to 38 weeks after conception, i.e., minimum 38 weeks gestational age will be considered that full-term birth adolescents.

2.5.4. Gender
Gender refers specifically to the biological characteristics, which indicate membership in one of two categories i.e. Male and Female considered for this study.

2.6. Measurement Tools

2.6.1. Stroop Colour and Word Test
To assess the cognitive ability of the individual, the Stroop Colour and Word Test by Golden & Freshwater was used, reliability of the stroop score is highly consistent across different versions of the test [11]. In all cases experimenter has looked test-retest reliability i.e. 0.70. Initially researcher was categorized the Adolescents those birth were preterm & Adolescents those birth were full-term, and Both groups was equally classified in male and female and administered the Stroop Colour and Word test on 120 subjects and recorded the score with the help of individual interview techniques.

2.7. Purposed Statistical Procedure
The sample was available for statistical analysis consisted of 120 subjects after data collection. For the each subject, initially data of each group were separately scrutinized by employing descriptive statistics i.e. mean and Standard Deviation (SD). The statistical analysis will be mainly consisted of inferential statistics i.e. Two Way Analysis of Variance (ANOVA) and Post Hoc Comparison i.e. Least Significant Differences (LSD) on Nature of Birth and gender with the help of SPSS.

3. Results and Discussion
Since the proposed statistical analysis mainly consisted of descriptive and Structural Equation Modelling (SEM) Using AMOS, each of the above to groups was separately scrutinized including the search for the univariate outliers. Initially, the data of each group were separately scrutinized by employing descriptive statistics. In addition, specific assumptions underlying the employed analysis techniques were also evaluated and the brief relevant comments in this regard found at appropriate places.
3.1. Descriptive Statistics

Descriptive analysis (Table 2) on measure of various considered constructs including cognitive ability of the individual as output of Nature of Birth i.e. Adolescents those birth were preterm & Adolescents those birth were full-term, and Gender (N= 120) revealed that,

- Descriptive values on measure of Gender namely Male and Female, indicating (20.20) male adolescent exhibit higher level of cognitive ability than (16.57) female adolescent.
- Descriptive values on measure of Nature of Birth i.e. Preterm and Full term, indicating (20.47) Full term birth adolescent exhibit higher level of cognitive ability than (16.30) Preterm birth adolescent.
- In addition Kolmogorov-Smirnov (Z Test) was found as significant which further revealed that data obtained on each considered psychological constructs is normally distributed for this considered population.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Kolmogorov-Smirnov (Z)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>20.20</td>
<td>6.45</td>
<td>0.174</td>
<td>0.01</td>
</tr>
<tr>
<td>Female</td>
<td>16.57</td>
<td>5.73</td>
<td>0.152</td>
<td>0.01</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>16.30</td>
<td>5.52</td>
<td>0.179</td>
<td>0.01</td>
</tr>
<tr>
<td>Full term birth</td>
<td>20.47</td>
<td>6.47</td>
<td>0.140</td>
<td>0.01</td>
</tr>
</tbody>
</table>

3.2. Structural Equation Modelling (SEM) using Analysis of Moment Structures (AMOS)

It actualizes the general way to deal with information investigation known as structural equation modelling (SEM), also known as analysis of covariance structures, or causal modelling (Figure 1). This approach incorporates, as uncommon cases, some notable ordinary systems, including the general straight model and normal factor investigation.

![Path Diagram of Structural equation modelling (SEM) for Nature of Birth i.e. preterm and full term birth cognitive ability of an individual.](image)

**Figure 1.** Showing Path Diagram of Structural equation modelling (SEM) for Nature of Birth i.e. preterm and full term birth cognitive ability of an individual.

Estimates of regression weights indicted that when Gender goes up by 1, cognitive ability of an individual goes down by 3.633. The regression weight estimate, -3.633, has a standard error of about 1.040. Dividing the regression weight estimate by the estimate of its standard error gives z=-3.633/1.040 = -3.492 (Table 3). In other words, the regression weight estimate is 3.492 standard errors below zero. The probability of getting a
critical ratio as large as 3.492 in absolute value is less than 0.001. In other words, the regression weight for Gender in the prediction of cognitive ability of an individual is significantly different from zero at the 0.001 level (two-tailed). Estimates of regression weights show that when Birth goes up by 1, cognitive ability of an individual goes up by 4.167. The regression weight estimate, 4.167, has a standard error of about 1.040. Dividing the regression weight estimate by the estimate of its standard error gives $z = 4.167/1.040 = 4.005$ (Table 3). In other words, the regression weight estimate is 4.005 standard errors above zero. The probability of getting a critical ratio as large as 4.005 in absolute value is less than 0.001. In other words, the regression weight for Birth in the prediction of cognitive ability of an individual is significantly different from zero at the 0.001 level (two-tailed).

**Table 3.** Regression Weights: (Group number 1-Default model).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>*S.E</th>
<th>^C.R</th>
<th>^P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive ability of an individual</td>
<td>-3.633</td>
<td>1.040</td>
<td>-3.492</td>
<td>***</td>
</tr>
<tr>
<td>Cognitive ability of an individual</td>
<td>4.167</td>
<td>1.040</td>
<td>4.005</td>
<td>***</td>
</tr>
</tbody>
</table>

*#S.E-Standard Error, ^C.R-Critical Ratio, ^P-Significance.*

Estimates of means of exogenous variables reveal that the mean of gender and birth are estimated to be 1.500. The estimate of the mean, 1.500, has a standard error of about .046. Dividing the estimate of the mean by the estimate of its standard error gives $z = 1.500/.046 = 32.756$. In other words, the estimate of the mean is 32.756 standard errors above zero. The probability of getting a critical ratio as large as 32.756 in absolute value is less than 0.001. In other words, the mean of gender and birth are significantly different from zero at the 0.001 level (two-tailed) (Table 4).

**Table 4.** Means: (Group number 1 - Default model).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>*S.E</th>
<th>^C.R</th>
<th>^P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1.500</td>
<td>0.046</td>
<td>32.756</td>
<td>***</td>
</tr>
<tr>
<td>Birth</td>
<td>1.500</td>
<td>0.046</td>
<td>32.756</td>
<td>***</td>
</tr>
</tbody>
</table>

*#S.E-Standard Error, ^C.R-Critical Ratio, ^P-Significance.*

Estimates of intercepts for predicting endogenous variables show that the intercept in the equation for predicting cognitive ability of an individual is estimated to be 17.583. The estimate of the intercept, 17.583, has a standard error of about 2.268. Dividing the estimate of the intercept by the estimate of its standard error gives $z = 17.583/2.268 = 7.754$. In other words, the estimate of the intercept is 7.754 standard errors above zero. The probability of getting a critical ratio as large as 7.754 in absolute value is less than 0.001. In other words, the intercept in the equation for predicting cognitive ability of an individual is significantly different from zero at the 0.001 level (two-tailed) (Table 5).

**Table 5.** Intercepts: (Group number 1-Default model).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>*S.E</th>
<th>^C.R</th>
<th>^P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Ability of an individual</td>
<td>17.583</td>
<td>2.268</td>
<td>7.754</td>
<td>***</td>
</tr>
</tbody>
</table>

*#S.E-Standard Error, ^C.R-Critical Ratio, ^P-Significance.*

Estimates of variances of exogenous variables indicate that the variance of Gender is estimated to be 0.250. The variance estimate, 0.250, has a standard error of about 0.032. Dividing the variance estimate by the estimate of its standard error gives $z = 0.250/0.032 = 7.721$. In other words, the variance estimate is 7.721 standard errors
above zero. The probability of getting a critical ratio as large as 7.721 in absolute value is less than 0.001. In other words, the variance estimate for Gender is significantly different from zero at the 0.001 level (two-tailed). The variance of Birth is estimated to be 0.250. The variance estimate, 0.250, has a standard error of about 0.032. Dividing the variance estimate by the estimate of its standard error gives \( z = 0.250/0.032 = 7.721 \). In other words, the variance estimate is 7.721 standard errors above zero. The probability of getting a critical ratio as large as 7.721 in absolute value is less than 0.001. In other words, the variance estimate for Birth is significantly different from zero at the 0.001 level (two-tailed). The variance of \( e_1 \) (cognitive ability of an individual) is estimated to be 32.262. The variance estimate, 32.262, has a standard error of about 4.179. Dividing the variance estimate by the estimate of its standard error gives \( z = 32.262/4.179 = 7.721 \). In other words, the variance estimate is 7.721 standard errors above zero. The probability of getting a critical ratio as large as 7.721 in absolute value is less than 0.001. In other words, the variance estimate for \( e_1 \) (cognitive ability of an individual) is significantly different from zero at the 0.001 level (two-tailed) (Table 6).

**Table 6. Variances: (Group number 1-Default model).**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>#S.E</th>
<th>*C.R</th>
<th>^P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.250</td>
<td>0.032</td>
<td>7.721</td>
<td>***</td>
</tr>
<tr>
<td>Birth</td>
<td>0.250</td>
<td>0.032</td>
<td>7.721</td>
<td>***</td>
</tr>
<tr>
<td>( e_1 ) (Cognitive Ability of an individual)</td>
<td>32.262</td>
<td>4.179</td>
<td>7.721</td>
<td>***</td>
</tr>
</tbody>
</table>


Discoveries are concordance with consider directed by Macey and team [12] portrays impacts of the introduction of an untimely baby on the family framework and spotlights on how issues related with untimely birth, for example, newborn child disease, hospitalization, and youthfulness can put the family in danger. Preterm babies demonstrated less exploratory play and remained nearer to their moms amid free play. The way that these distinctions are not reflected in examples of connection, a key measure of the mother–newborn child relationship, is talked about. Bhutta and team [13] led examine on the intellectual and conduct results of school-matured kids who were conceived preterm have been accounted for widely. Kids who were conceived preterm are in danger for diminished intellectual test scores and their youthfulness during childbirth is straightforwardly relative to the mean psychological scores at school age. Preterm-conceived kids likewise demonstrate an expanded occurrence of ADHD and different practices. Stewart and team [14] researched the impact of extremely preterm birth on mind structure and neurocognitive and social working in young people. Subsequently Interpretation is Individuals conceived extremely preterm demonstrate an overabundance of neurocognitive and social issues in youths, and the greater part have strange MRI cerebrum checks.

**4. Conclusion**

It could be concluded from the results that the nature of birth i.e. Preterm Birth and Full term Birth is the significant predictor of cognitive ability of an individual. Gender is the significant predictor of cognitive ability of an individual.

**5. Conflicts of Interest**

The author(s) report(s) no conflict(s) of interest(s). The author along are responsible for content and writing of the paper.
6. Acknowledgment

NA

7. References