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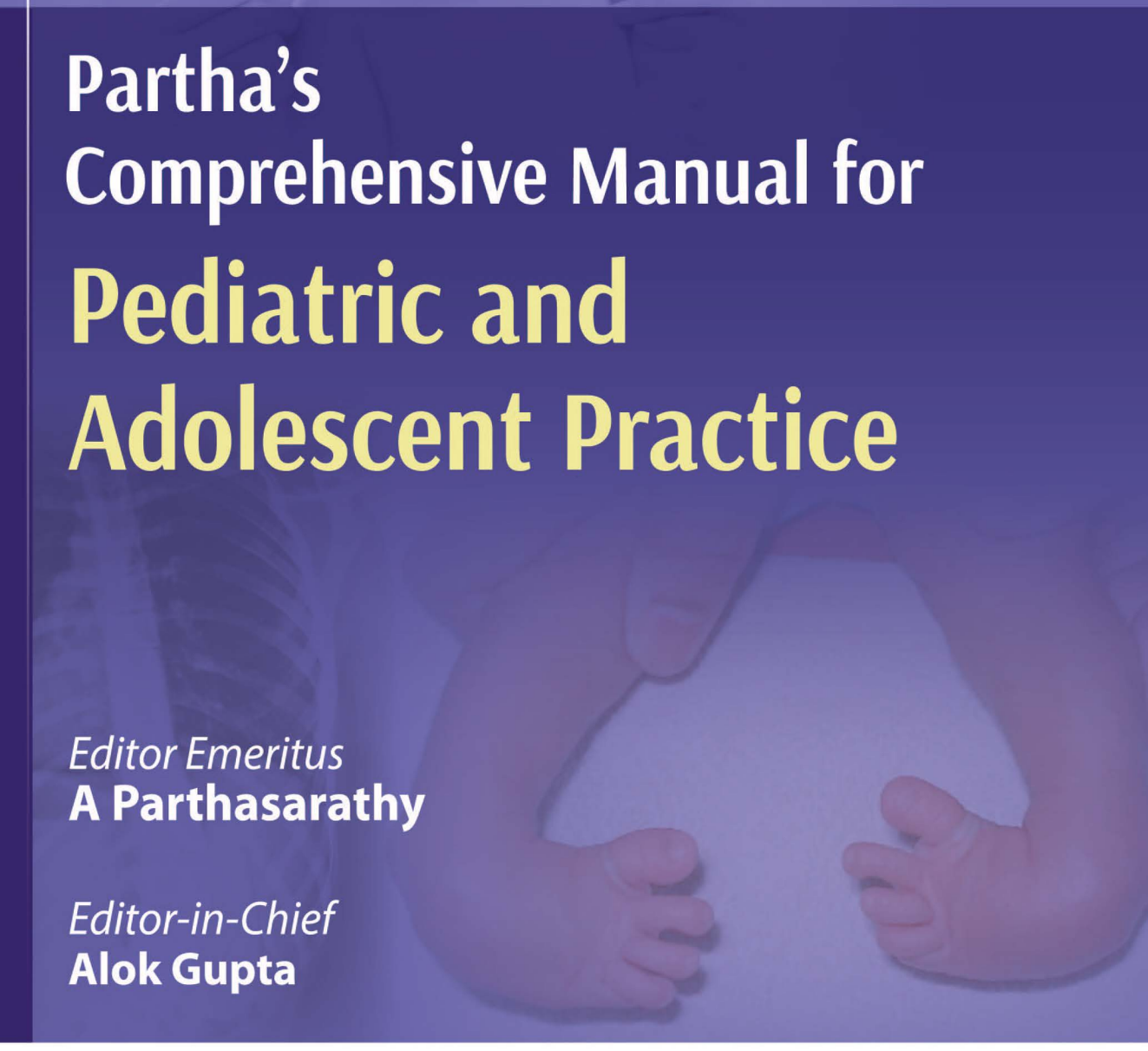

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JAYPEE

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CHAPTER

Growth and Development

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2.1 HEALTHY BABY CONCEPT: BIOPSYCHOSOCIAL APPROACH

DEFINITION

Preconception care is provision of biomedical, behavioral and social health interventions to women and couples before conception.

STEPS

- *Family planning and contraception*: To avoid unplanned conception.
- *Folic acid:* To reduce the risk of neural tube defects (NTDs)—start 1 month before conception and till 3 months after conception.
  - *Childbearing age: Folic acid 0.4–0.5 mg daily*
  - *Moderate risk of NTDs:* [Family history of NTD in a first/second-degree relative, maternal diabetes (type I or II), maternal malabsorption syndrome]—*Folic acid 1 mg daily*
  - *High risk of NTDs:* [NTDs in women or partners, or NTDs in previous pregnancy, BMI > 30 kg/m^2, women with methylene tetrahydrofolate reductase gene mutation, hemoglobinopathies (beta thalassemia), anticonvulsant medication)—*Folic acid 4 mg daily.*
- *Anemia:* Weekly 100 mg elemental iron and 500 µg folic acid. Albendazole 400 mg once—in preconception period.
- *Optimal body weight management:* Prior to conception, maintain *body mass index* (*BMI*) — 18–23 kg/m^2.
  - Overweight and obesity
    - *First line*: Focused counseling, nutrition modification, aerobic and strength-conditioning exercises
    - *Target*: Weight loss of 5–10% over 6 months.
- Genetics
  - Three-generation family medical history
  - Consanguinity
  - Known or suspected hereditary disease in patient/family member
  - Teratogen exposure/infection
  - Presence of birth defects, chromosomal abnormality (Down's syndrome), intellectual disability, developmental delay in a parent, a child, or the child of a family member, recurrent pregnancy loss.
- Chronic medical conditions
  - *Diabetes mellitus:* Screen all women
    - *Pregestational diabetes:* Fasting plasma glucose ≥126 mg/dL or 2 hours plasma glucose ≥200 mg/dL
    - *Pre-existing diabetes mellitus:* Achieve glucose level of 80–110 mg/dL (fasting) and an HbA1c goal of <6.5% before conception
  - *Hypothyroidism:* Screen
    - Symptomatic women, women from endemic area
    - Family/personal history of thyroid disease, type 1 or type 2 diabetes
    - History of miscarriage, preterm delivery

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- History of head/neck radiation
- Morbid obesity (BMI > 40)
  - Treat overt hypothyroidism—elevated thyroid stimulating hormone (TSH) with low FT4 levels
  - Subclinical hypothyroidism (elevated TSH with normal FT4 concentration)—further evaluation needed
  - Confirmed hypothyroidism—increase levothyroxine by 30% at confirmation of pregnancy.

- Pre-existing hypertension
  - No target organ damage, target blood pressure is set at 150/100 mm Hg
  - Target organ damage present—maintain BP below 140/90 mm Hg.
  - Angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) are preferred.
- Pre-existing seizure disorders
  - Stable anticonvulsant regimen for at least 6 months.
  - *Folic acid supplementation*, 4 mg daily, 1 month prior to conception till the end of the first trimester
  - Continue folic acid throughout pregnancy for prevention of anticonvulsant induced megaloblastic anemia.
- *Autoimmune diseases:* Systemic lupus erythematosus (SLE)—high risk of spontaneous abortion, premature delivery, intrauterine growth restriction (IUGR), superimposed pre-eclampsia. A quiescent SLE state for at least 6 months before conception.
- Psychosocial issues
  - Psychiatric illnesses
  - Personal/family history—screen for depression, anxiety, mania, schizophrenia.
- Vaccine-preventable diseases
  - Aims:
    - To prevent maternal/fetal infections
    - Prevent perinatal transmission
    - Avoid neonatal complications
    - Strong evidence for measles, mumps, and rubella (MMR) and hepatitis B vaccines.
      - MMR vaccine
        - Screen for rubella infection, vaccinate if nonimmune
        - Preferably avoid pregnancy for 3 months after the MMR vaccination
        - Accidental vaccination in pregnancy—no substantial risk to the fetus
        - Not an indication for termination of pregnancy.
      - Hepatitis B vaccination: High-risk of infection—receiving blood products, healthcare workers.

      Desirable vaccines
      - *Human papillomavirus* (HPV)
        - Decrease the incidence of benign and malignant cervical lesions
        - Women and girls (9–26 years of age) if not completed earlier
      - Varicella
        - Vaccinate nonimmune women
        - Avoid pregnancy for a month

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    - Influenza
        - Women at high risk of influenza-related complications
        - Avoid live intranasal vaccine
    - Tetanus, diphtheria and pertussis (Tdap)
- *Preconceptional counseling in women with previous miscarriages:*
  Recurrent miscarriages—two or more abortions.
  - Test for antiphospholipid antibody syndrome (APS), anticardiolipin antibodies (aCL), lupus anticoagulant (LAC), and anti-beta 2 glycoproteins (anti-B2GP) on two occasions, 12 weeks apart
  - Three or more miscarriages—genetic counseling, karyotyping of parents
  - Pelvic ultrasound
  - Testing for syphilis
  - Thyroid function and glucose monitoring.

2.2 HEALTHY FETUS: ANTENATAL CARE IN VIEW

DEFINITION

Antenatal care (ANC) is systematic monitoring of women during pregnancy for:
- Progress of fetal growth
- Wellbeing of the mother and the fetus.

SUGGESTED SCHEDULE FOR ANTENATAL CARE

- 1st visit—within 12 weeks
- 2nd visit—14–26 weeks
- 3rd visit—28–34 weeks
- 4th visit—36 weeks term.

First Visit/Registration

- Within 12 weeks of suspected pregnancy
- *Daily 400 µg of folic acid:* 2–3 months preconception—first 12 weeks of pregnancy.

COMPONENTS OF ANTENATAL CARE

History-taking

First Antenatal Care

- Confirm the pregnancy
- EDD = Date of LMP + 9 months + 7 days.
- *Family history of systemic illness:* Hypertension (HT), diabetes mellitus (DM) or tuberculosis (TB).

PHYSICAL EXAMINATION

- *General examination:* Pallor, jaundice, edema
- *Blood pressure (BP)*: Every visit

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  - *HT*: Two consecutive readings taken four hours or more apart, systolic BP is 140 mm Hg or more and/or the diastolic is 90 mm Hg or more
  - Urine albumin (+2) with high BP—pre-eclampsia
  - Diastolic BP > 110 mm Hg—imminent eclampsia
- *Weight:* Every visit
  - *Normal:* 9–11 kg after first trimester @ 2 kg/month
  - *Excess:* >3 kg in a month; rule out pre-eclampsia, multiple pregnancy, DM
- *Breast examination*: For inverted or flat nipples
  - Flat nipples that can be pulled out, will not interfere with breastfeeding
- *Abdominal examination*
  - *Fetal lie and presentation*
    - *Transverse lie*: Normal before 32 weeks
    - *Term*: Longitudinal lie with cephalic presentation
  - *Fetal heart sound and fetal heart rate (FHR)*
    - Normal FHR 120–160 beats/minute.
    - *Pathological:* Less than 120 beats/minute or more than 160 beats/minute
    - Auscultated after 24 weeks of gestation.
  - *Fetal movements:*
    - Multigravida—18 weeks
    - Around 22 weeks in a primigravida.

LABORATORY INVESTIGATIONS

- *Hemoglobin:* Base line Hb—first ANC visit and in subsequent three ANC.

Hemoglobin level	*Degree of anemia*
>11 g/dL	No anemia
7–11 g/dL	Moderate anemia
>7 g/dL	Severe anemia

- *Blood grouping, Rh factor:* Third ANC
- *Urine albumin: Every ANC.* To detect pre-eclampsia and eclampsia
- *Thyroid function tests:* Measure serum thyroid stimulating hormone (TSH). If abnormal, measure free thyroxine (FT4).
- *Screening for gestational DM:*
  - 2-hour reading after ingestion of 75 g of glucose
  - *Gestational diabetes:* Blood sugar above 140 mg/dL
  - Screen between 24 and 28 weeks of gestation.

INTERVENTIONS

- Iron prophylaxis/therapy
  - *Prophylactic dose:* One tablet of iron folic acid (IFA) (100 mg elemental iron and 0.5 mg folic acid) daily for at least 100 days from 14–16 weeks of gestation (after the first trimester). Continue three months postpartum.
  - *Therapeutic dose:* If anemic (hemoglobin less than 11 g/dL), two IFA tablets daily for three months. Continue three months postpartum.
    - *Vitamin D deficiency:* May lead to gestational diabetes, increased infection risk, cesarean section, low birth weight, increased risk of pre-eclampsia.

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- *Hypothyroidism*: In the first trimester is associated with pregnancy complications like pre-eclampsia, placental abruption, postpartum depression, preterm birth, low birth weight, fetal death and intellectual impairment during childhood.
- *Tdap/Td vaccine:* One dose Tdap/Td in early 3rd trimester if previous schedule complete or complete as per status (one dose Tdap at least is preferred)
- *Diet and rest:* During pregnancy—300 kcal extra per day. Postpartum—500 kcal extra.

RECOMMENDED DIETARY INTAKE FOR INDIANS (ICMR) ADULT WOMEN (ADDITIONAL IN PREGNANCY)

Food items	*Sedentary work*	*Moderate work*	*Heavy work*	*Gram*	*Kcal*
Cereals	410	440	575	35	118
Pulses	40	45	50	15	52
Milk	100	150	200	100	83
Fat	20	25	40		
Sugar	20	20	40		
Leafy vegetables	100	100	50		
Other vegetables	40	40	100		
Roots and tubers	50	50	60		
Total	1875	2225	2925	160	293

Breastfeeding Counseling

Initiate breastfeeding within 1 hour after birth, even in cesarean.

Mental Health of the Mother

- Anxiety—shorter gestation, adverse implications for fetal neurodevelopment.
- Chronic strain and depressive symptoms—lower birth weight infants with developmental consequences.

2.3 HEALTHY NUTRITION

INTRODUCTION

- The under-five population of India accounts for 112.8 million
- It has the largest numbers of under-five children who are moderately or severely stunted, accounting for 38% of the global burden.

INFANT AND YOUNG CHILD NUTRITION

- *Critical window period for nutritional interventions:* First 1000 days of life—270 days *in utero* followed by the first two years after birth
- Phase of maximal brain growth

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- Malnutrition in this critical period can cause stunting and suboptimal developmental outcome
- Refer to Chapter 3.1 for Infant and Young Child Feeding Guidelines.

CALORIFIC REQUIREMENTS OF CHILDREN AT VARIOUS AGES

Age group	*Energy (Kcal/d)*	*Protein (g/d)*	*Iron (mg/d)*	*Vitamin A (µg/d) retinol*
0–6 months	118/kg	2.05/kg		350
6–12 months	108/kg	1.65/kg		
1–3 years	1240	22	12	400
4–6 years	1690	30	18	400

CONCEPT OF BALANCED DIET

- Children need a balanced diet with food from all 3 food groups namely vegetables and fruit, whole grain products, and protein foods
- Children should have 3 proper meals a day and 1–3 snacks (morning, afternoon and possibly before bed). Healthy snacks are just as important as the food you serve at meals
- Whole, fresh and unprocessed food like fresh fruits and vegetables, whole grains, dairy, and meats are the best foods for children
- *Sugar intake:* Limit refined sugars (sucrose, glucose-fructose, white sugar) honey, molasses, syrups, and brown sugar. They all have similar calorie counts and contribute to tooth decay
- Set regular meal and snack times and eat with your children
- Offer a balance and variety of foods from all three food groups at mealtimes
- Offer food in ways they can manage easily. For example, cut into pieces, or mash food to prevent choking in younger children
- Help your children learn to eat independently
- Include your child in age appropriate food preparation and table setting
- Serving fruit instead of fruit juice also adds healthy fiber to your child's diet
- Serve vegetables and fruit more often than fruit juice. Offer water when your child is thirsty, especially between meals and snacks. Limit juice to one serving [125 mL (4 oz)] of 100% unsweetened juice a day.

AVOIDANCE OF 'JUNCS'

- An acronym which stands for:
  - **J**—Junk foods (foods high in fats, especially saturated and trans-fats, sugars and salts, and foods lacking in micronutrients/minerals)
  - **U**—Ultra processed foods (as defined in the fourth category of NOVA classification)
  - **N**—Nutritionally inappropriate foods. Home-made foods can also qualify to be nutritionally inappropriate if prepared in recycled oil, or contain high amount of sugar, fat or salt
  - **C**—Caffeinated/colored/carbonated beverages
  - **S**—Sugar sweetened beverages

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- A National Consultative group constituted by the Nutrition Chapter of the Indian Academy of Pediatrics (IAP), consisting of various stakeholders in private and public sector on 11th March 2019 at New Delhi and new consensus statements and recommendations were formulated
- The Group suggests a new acronym 'JUNCS' foods to indicate unhealthy foods (Junk foods, Ultra-processed foods, nutritionally inappropriate foods, caffeinated/colored/carbonated foods/beverages, and sugar-sweetened beverages)
- The Group concludes that consumption of these foods and beverages is associated with higher free sugar and energy intake; and is associated with higher body mass index (and possibly with adverse cardiometabolic consequences) in children and adolescents
- Intake of caffeinated drinks may be associated with cardiac and sleep disturbances
- The Group recommends avoiding consumption of the JUNCS by all children and adolescents as far as possible and limit their consumption to not more than one serving per week
- The Group recommends intake of regional and seasonal whole fruits over fruit juices in children and adolescents, and advises no fruit juices/drinks to infants and young children (age < 2 years), whereas for children aged 2–5 years and >5–18 years, their intake should be limited to 125 mL/day and 250 mL/day, respectively
- The Group recommends that caffeinated energy drinks should not be consumed by children and adolescents
- The Group supports recommendations of ban on sale of JUNCS foods in school canteens and in near vicinity and suggests efforts to ensure availability and affordability of healthy snacks and foods
- The Group supports traffic light coding of food available in school canteens and recommends legal ban of screen/print/digital advertisements of all the JUNCS foods for channels/magazines/websites/social media catering to children and adolescents
- The Group further suggests communication, marketing and policy/taxation strategies to promote consumption of healthy foods, and limit availability and consumption of the JUNCS foods.

ASSESSMENT OF GROWTH

Refer to Chapter 3.4 for tools of growth assessment.

LIFESTYLE MODIFICATION

- An adjunct to healthy nutrition
- Regular physical activity
- Stress management in children
- Adequate sleep
- Screen-time regulation.

2.4 HEALTHY PARENTING

DEFINITION

Parenting is the art of nurturing children. It includes planning for parenthood, acquiring knowledge and skills of parenting, and adjustment of resources to meet the needs of children.

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FACTORS INFLUENCING PARENTING

- Structure of family
- Interpersonal relationship between spouses
- Lifestyle of family
- Resource availability
- Age and education of parents
- Existing parenting practices in immediate environment
- Reason behind having/planning a child-couples' own mature decision, parents wish, societal pressure, sometimes completely unwanted pregnancies.

PRINCIPLES OF POSITIVE PARENTING

- Ensuring a safe, engaging environment
- Creating a positive learning environment
- Using assertive discipline
- Having realistic expectations
- Taking care of yourself as a parent.

GUIDELINES FOR GOOD PARENTING

- *Set good standards for behavior:* From very young age, children imitate their parents. Children form their consciences based on likes or dislikes of parents
- *Adapt parenting that fits with child accordingly:* Every child is unique
- *Establish defined rules with firm nonviolent consequences*: Parents should set reasonable expectations and boundaries for children regarding their behavior
- *Treat child with respect:* For every right decision child must be praised and every wrong decision must be corrected with positive criticism
- *Do not set very high expectations*: Every child is gifted with unique skills and pace of learning. Therefore, parents should not push the child very hard for higher achievement
- Positive punishment is much better than negative one
- *Expression of love and warmth:* Every human being likes to be loved and given importance Being loved by parents make children feel important and wanted by parents which ultimately motivate them to become responsible towards their parents
- Look for guidance and counseling when a need is felt.

PARENTING STYLES

- Typical ways parents think, feel and behave in terms of child-rearing. The most widely known categories of parenting styles are based on the work of Diana Baumrind
- *Two dimensions of parenting style:* Authority and Affection
- *Authority or demandingness:* Degree to which parents try to control their children's behavior by setting rational standards for behavior
- *Affection or responsiveness:* Amount and the way love is expressed to the child and acceptance of the child's points of view
- *Based on these dimensions, Baumrind identified three categories of parenting styles:* Authoritative parenting, authoritarian parenting and permissive parenting. Maccoby and

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Martin (1983) expanded this parenting style model using a two-dimensional framework. They made further distinction by expanding Baumrind's permissive parenting into two different types: permissive parenting (also known as indulgent parenting) and neglectful parenting (also known as uninvolved parenting). These four parenting styles are sometimes called the Baumrind parenting styles or Maccoby and Martin parenting styles.

- *Parenting styles chart:* Figure 2.4.1 parenting styles are categorized by demandingness and responsiveness

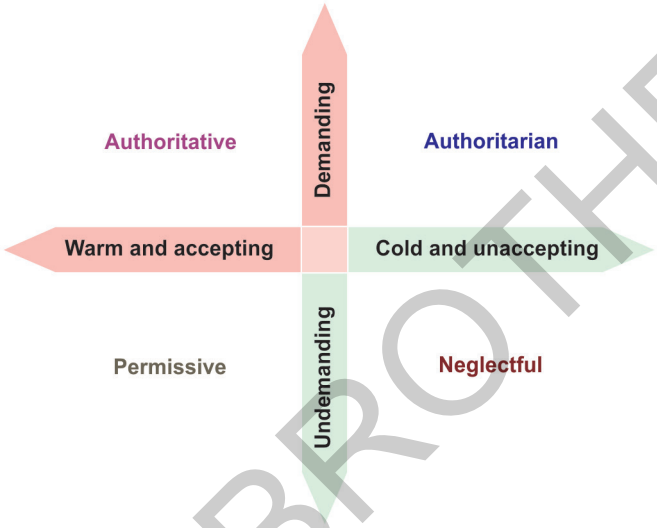

Fig. 2.4.1: Parenting styles chart.

- Authoritative parenting
  - High demandingness. High responsiveness
  - Authoritative parents have high expectations for achievement and maturity, but they are also warm and responsive
  - These parents set rules and enforce boundaries by having open discussion and using reasoning
  - They are affectionate and supportive and encourage independence
  - This parenting style is also known as Democratic Parenting Style
  - Based on Baumrind's research, children of authoritative parents
    - Appear happy and content
    - Are more independent
    - Achieve higher academic success
    - Develop good self-esteem
    - Interact with peers using competent social skills
    - Have better mental health—less depression, anxiety, suicide attempts, delinquency, alcohol and drug use
    - Exhibit less violent tendencies
- Authoritarian parenting
  - High demandingness. Low responsiveness
  - This parental style demand high standards but authoritarian parents demand blind obedience using reasons such as "because I said so"

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  - These parents use stern discipline and often employ punishment to control children's behavior
  - Authoritarian parents are unresponsive to their children's needs and are generally not nurturing
  - Children of authoritarian parents
    - Tend to have an unhappy disposition
    - Are less independent
    - Appear insecure
    - Possess lower self-esteem
    - Exhibit more behavioral problems
    - Perform worse academically
    - Have poorer social skills
    - Are more prone to mental issues
    - Are more likely to have drug use problems
    - Parents show indulgent behavior while boy is acting like a king—Permissive Parenting
- Permissive parenting (indulgent)
  - Low demandingness. High responsiveness
  - Permissive parents set very few rules and boundaries and they are reluctant to enforce rules
  - These parents are warm and indulgent, but they do not like to say no or disappoint their children
  - Children of permissive parenting
    - Cannot follow rules
    - Have worse self-control
    - Possess egocentric tendencies
    - Encounter more problems in relationships and social interactions
- Neglectful parenting (uninvolved)
  - Low demandingness. Low responsiveness
  - Neglectful parents do not set firm boundaries or high standards
  - They are indifferent to their children's needs and uninvolved in their lives
  - These uninvolved parents tend to have mental issues themselves such as maternal depression, physical abuse or child neglect when they were kids
  - Children of neglectful parents
    - Are more impulsive
    - Cannot self-regulate emotion
    - Encounter more delinquency and addictions problems
    - Have more mental issues, e.g. suicidal behavior in adolescents
- From decades of studies, researchers found that authoritative parenting is consistently linked to the best outcomes in kids
- Therefore, authoritative parenting style is considered the best and most effective parenting style by psychologists and psychiatrists.

Factors Affecting Parental Style

- Ethnic background and culture
- Child Temperament
- Children's own behavior can affect the parent's choice and the outcomes, too

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- Children with a more sensitive temperament may be perceived as difficult causing the parents to change their parenting style towards authoritarian parenting
- "Good Parenting-Good Children".

2.5 HEALTHY CHILDHOOD AND GROWING UP

GROWTH

Hurlock has defined Growth as "change in size, in proportion, disappearance of old features and acquisition of new ones".

STAGES OF GROWTH

Prenatal Period

- 9 months or 40 weeks
- *Three stages:* Zygote (first 2 weeks); embryo (from 2 to 8 weeks), fetus (from 2 to 10 months).

Postnatal Period

Infancy

- The first year of life
- Period of rapid growth. More than 50% of birth length and 200% of birth weight take place.

Childhood

- The end of infancy—start of adolescence
- Early childhood—period of eruption of milk teeth
- Middle childhood—(7–10 years), period of eruption of permanent teeth
- Late childhood—starts from the prepubertal period and continues up to puberty.

Adolescence

- Puberty to around 20 years
- Sexual maturity is attained
- Adolescent growth spurt
  - *Boys*: 12–15 years
  - *Girls*: About 2 years earlier.

MEASURING GROWTH

The most accurate and sensitive measure of growth is weight gain.

Recommended Intervals and Parameters for Growth Monitoring

- *Birth to 3 years:* Penile length (PL) and testicular descent in the newborn period
  - Weight, length, head circumference—at birth, 6, 10 and 14 weeks, 9 months, 15–18 months
  - After 18 months—every 6 months
  - Measure head circumference up to 3 years of age
- *4–8 years:* Measure height and weight 6 monthly. Body mass index (BMI), PL and sexual maturity rate (SMR)—yearly from 6 years of age
- *9–18 years:* Height, weight, BMI and SMR yearly.

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