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An External and Internal Understanding: Female Puberty

***Girl Talk Inc.* Female Puberty Education**

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Leadership Studies Minor- Capstone Project

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Abstract

As a lifelong learner and student, I have learned that leadership, public awareness, and women's health are important topics to focus on. Puberty is a process that occurs within female adolescence every day, but the external and internal understanding to why and how it occurs is rarely explored within U.S. school systems. *Girl Talk Inc.* is a school-based program that focuses on girls from diverse backgrounds to establish self-esteem, a love of learning, and assist with future educational endeavors. The one aspect that is not emphasized within the program is the understanding of female puberty. This is where I am organizing an educational plan for elementary, middle, and high school students pertaining to this topic. It will be incorporated within the 2019-2020 *Girl Talk Inc.* curriculum and future curriculums.

Key words: puberty, female, students, leadership

By the U.S Census Bureau, seven point six billion people reside on this planet. Of those individuals, 49.5% of them are female, and 51.5% of them are male (World Bank). These individuals come from many socioeconomic statuses, cultures, ethnicities, and circumstances, but one phase that a large majority of them will, are, or have experienced is growth and development. All these individuals will experience stages of growth and development like “infancy and toddlerhood, early childhood, middle childhood, adolescence, young adulthood, middle adulthood, and late adulthood” (Papalia, Olds, & Feldman, 2007). Within this cycle, puberty occurs between middle childhood and adolescence, and it is considered to be one of the most rigorous stages of development. Compared to males though, females are impacted to a larger extent as it becomes a stage where the possibility of carrying future life emerges. For this reasoning, the external (outer appearance) and internal (hormonal) understanding of female puberty is fundamental.

Female Puberty: An External Understanding

Puberty for females normally happens between the ages of 8-14 (Blondell, Foster, & Dave, 1999; Peri, 2011), and it lasts through adolescence and later years for some individuals. How puberty affects an individual varies from person to person as differences in weight, height, muscle mass, nutrition, race and many additional factors can affect puberty. Puberty is a period where immense changes occur in the female body: increased hormones, breast development, hair growth, increased weight, menstruation, and emotional fluctuations.

Primarily, understanding hormones that participate in development and growth is necessary. Before puberty occurs within girls, the levels of hormones are relatively low, but when the onset of puberty occurs, gonadotropin releasing hormone (GnRH) is released by the hypothalamus within the brain. GnRH then stimulates the production of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) in the pituitary gland. These hormones travel to the ovaries to generate the production of estrogen and progesterone which leads to the development and growth of the body (Science & Nature -

Human Body and Mind – Teenagers, 2014; Sisk & Foster, 2004). The increase of hormones leads to different effects.

The development of breasts is usually one of the first aspects of puberty. As estrogen and progesterone are produced by the ovaries, the cells within the connective tissue of the breasts are directed to accumulate fat within their cells and the mammary ducts enlarge, which accounts for the increasing size of breasts during this time. According to the Stanford Children’s Health article “Puberty: Adolescent Female,” developing breasts go through five stages from birth to adulthood.

Stages of Breast Development	
Stage 1	(Preadolescent) only the tip of the nipple is raised
Stage 2	Buds appear, breast and nipple raised, and the areola (dark area of skin that surrounds the nipple) enlarges
Stage 3	Breasts are slightly larger with glandular breast tissue present
Stage 4	The areola and nipple become raised and form a second mound above the rest of the breast
Stage 5	Mature adult breast; the breast becomes rounded and only the nipple is raised

When dealing with breast development, not everyone will have the same breast size, shape, and position. The reason is due to hereditary and weight differences within people. Hereditary, by definition, is “the sum of all biological processes by which particular characteristics are transmitted from parents to their offspring” (Griffiths, Dobzhansky, & Robinson, 2019). Breast size, shape, and position are determined by the genetic background one comes from. One concern that most young women share, though, is the size difference that may occur as one breast might be slightly bigger or smaller than the other; this condition is called *breast asymmetry*. This aspect is normal within most cases as one breast might develop faster or slower than the other before they even out, or they may stay slightly different in size (Sissons, 2018). With weight, women’s breast size changes as weight is added or decreased on the body. Breasts continue to develop through adolescence and adulthood.

Another aspect of secondary sexual characteristics that occur during female puberty is hair growth. As stated in Stanford Children’s Health, pubic hair development happens after breast development, and armpit hair develops around the age of twelve. As puberty starts, a low level of androgenic hormones causes a gradual transition of vellus hair growth to terminal hair growth on the armpits, pubic area, the arms, and the legs (Brannon). Within prepubescents, vellus hair follicles cover a large portion of a female’s body except for the eyelashes and the scalp. Vellus hair follicles are shallow hairs within the upper portion of the sebaceous glandular lobule that are poorly pigmented; usually, they are referred to as “peach fuzz” (Miranda, Charlesworth, Tobin, Sharpe, & Randall, 2017; Uno, 1986). Vellus follicles gradually turn into intermediate (medium) follicles which later turn into terminal hair follicles. Intermediate (medium) hair follicles vary in length, but they tend to be between vellus hair length and terminal hair length. Terminal hair follicles are the deepest and tend to be the most pigmented due to multiple melanocytes. They span the entire skin layer, and the bulbs of the follicles tend to be in the cutaneous adipose layer (Uno, 1986). These are the three patterns of growth that hair follicles transition through numerous times to alter from vellus to intermediate to terminal hair follicles (Villines, 2017):

Pattern 1:	Anagen: The period of active hair growth, during which the hair grows longer. Vellus hair tends to have a shorter anagen phase than terminal hair.
Pattern 2:	Catagen: A period of transition, during which the hair follicle contracts and limits blood supply. The hair can easily fall out during this stage.
Pattern 3:	Telogen: A resting period during which the hair does not grow.

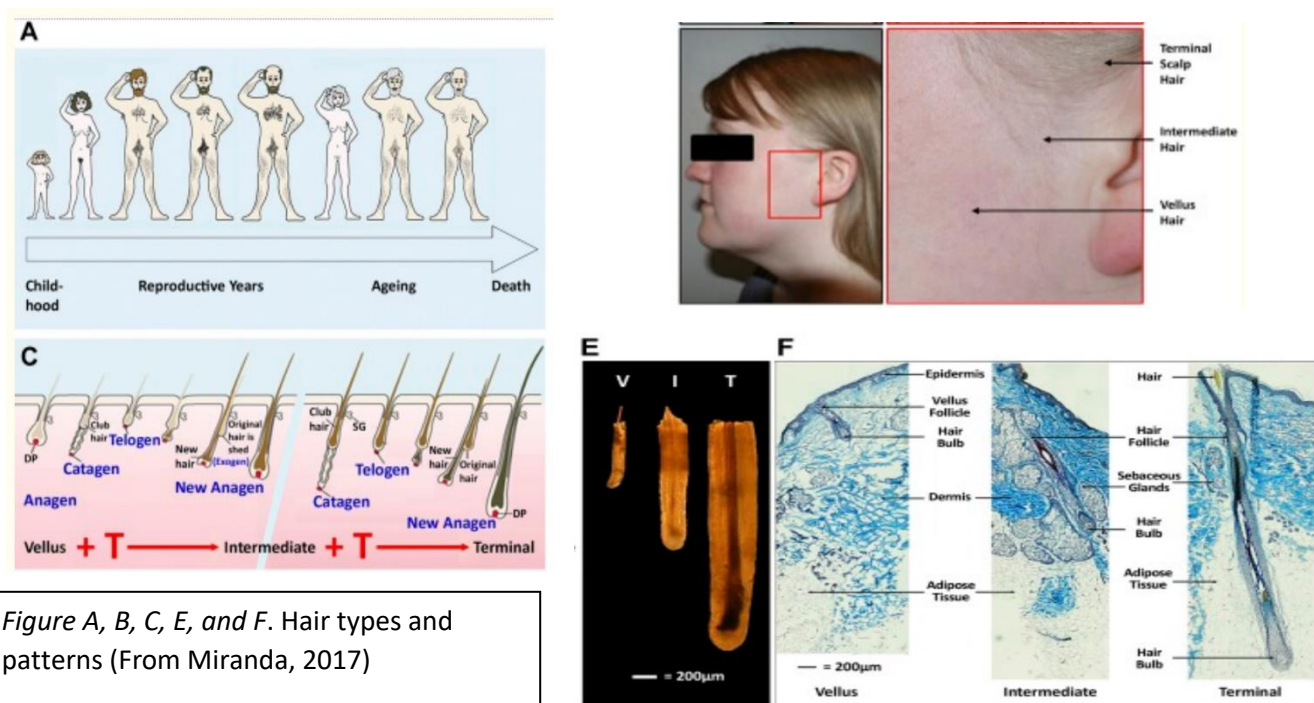


Figure A, B, C, E, and F. Hair types and patterns (From Miranda, 2017)

In addition, acne and body odor is more prevalent after puberty as hormones increase the secretion within sebaceous (oil) and sudoriferous (sweat) glands (“Puberty – Things That Change for Everyone,” n.d.). Within late adolescence (15-19), acne vulgaris is the most prominent acne condition , occurring in 85% of people going through puberty. Androgenic hormones (ex. Dihydrotestosterone), produced by the adrenal glands and the ovaries in females, stimulate the proliferation of noninflammatory (blackheads and whiteheads) and inflammatory (papules and pustules) pilosebaceous units (PSU), ductal lining cells, and keratinocytes. When the ductal lining cells cannot escape the PSU’s cavity, they get obstructed, so the production of sebum and hair growth is backed up within the PSU. This obstructed, nutrient filled cavity becomes an ideal location for the proliferation of *Propionibacterium acnes* which causes acne. *P. acnes* is an anaerobic, gram positive bacteria that is naturally a part of the skin’s flora; *Malassezia furfur* (yeast naturally found on the skin) can also become a pathogen. When immune cells recognize the lipoproteins of these bacteria, they attack these bacteria, which can cause inflammatory PSUs (Lynn, Umari, Dunnick, & Dellavalle, 2016).

In continuation, body odor can become apparent during puberty. Women are not as susceptible to foul body odor as men, but it can still occur. Between the ages of 8 and 14, apocrine glands are influenced by androgenic hormones (Androgen, 2014). The body has two distinctive sudoriferous (sweat) glands: eccrine glands and apocrine glands. Eccrine glands are in the dermis and are controlled by the sympathetic nervous system; they are commonly all over the body as they control body temperature. These glands are normally odorless as they just secrete sweat. On the other hand, apocrine glands are in the reticular dermis/subcutaneous tissue within the armpits, the groin, the breasts, the eyes, and the ears. Apocrine glands are regulated by the sympathetic nerve with the peripheral mechanisms controlled by catecholamines (stress hormones- dopamine, acetylcholine...etc.), and they are not thermal regulators (Teegee, 2019). Apocrine glands secrete sweat mixed with oily fluid within the gland's tubule ("Sweat Gland," 2018). This fatty sweat is odorless when it is in the tubule and when it first comes out, but when it interacts with the bacteria flora on the skin, the bacteria can decompose the fatty sweat into ammonia and short fatty acids which causes the pungent odor (Teegee, 2019; Wetter, 2018). The most common type of body odor condition that can occur because of this process is called apocrine bromhidrosis, or excessive odor. Like other processes that occur during puberty, many factors affect odor (Teegee, 2019).

Moreover, female puberty increases the shape, composition, and size of the body. Puberty produces the aspect that is generally referred to as a "growth spurt." Height is usually one of the primary components that is distinctive during puberty. For females, one-third of the skeletal mass is accumulated after 3 to 4 years of puberty, and ninety percent of the total skeletal mass is accumulated by the age of 18. Females peak at a height velocity of nine centimeters per year by the age of 12, and in total, around twenty-five centimeters of height are gained during pubertal development (Marshall & Tanner, 1969). Also, fifty percent of the total adult body weight is obtained during pubertal development. The peak weight velocity is 8.3 kg per year by the age of 12.5 (Rogol, Roemmich, & Clark, 2002). According to the article "Changes to Your Shape," females typically gain weight around their hips, thighs, and legs. According to Rogol, Roemmich, and Clark (2002), females have an increase in body fat percentage and

accrue fat mass at a rate of 1.14 kg per year. Also, muscle mass is gained during this time. Insulin-like growth factor 1 (IGF-1) is an important component for the development of muscle, connective tissue, cartilage, collagen, bone, and other aspects (Rogol et al., 2002). Testosterone is also utilized for maintaining skeletal strength and muscle mass (“Hormone Imbalance, Menstrual Cycles & Hormone Testing”) For all these components, gonadal and adrenal steroid hormones interact with growth hormone to lead to normal sexual maturation and pubertal development (Rogol et al., 2002).

Possibly one of the most distinctive milestones that occurs within a female’s lifetime is menarche. Menarche is “the onset of [a] female’s reproductive capacity” and the “onset of menstruation” (Carroll, 2006; Papadimitriou, 2016). This aspect of a female’s development is the gradual transition from childhood to adolescence. Menarche occurs 2 to 2½ years after breast development; the median age is 12-13, but the range can be from 7-16 (Carroll, 2006; Dowshen, 2015; Papadimitriou, 2016).

Primarily, it is necessary to discuss the hormonal and anatomical aspect of how menstruation occurs. When a fetus is in utero, the fetus has two sets of ducts called Mullerian ducts and Wolffian ducts. As the fetus grows, the cells of one of these ducts undergoes apoptosis (programmed cell death). For females, the Wolffian duct is degraded to leave the Mullerian duct that will eventually become the ovaries, the hormone producing sex organ (Alberts, Bray, Hopkin, Johnson, Lewis, Raff, ... & Walter, 2013). When girls are young, the hormonal level is relatively low, but as puberty occurs, GnRH initiates a chain reaction to turn on FSH (Follicle stimulating hormone) and LH (luteinizing hormone) which stimulates the ovaries to produce estrogen, estradiol, testosterone, and progesterone which control the menstrual cycle. These hormones have unique roles that work cooperatively to produce a monthly menstrual cycle (“Hormone Imbalance, Menstrual Cycles & Hormone Testing,” n.d.; Lacroix & Whitten, 2018; Reed & Carr, 2015; Sizonenko, 1989; “The Menstrual Cycle,” n.d.):

Hormone	Function
FSH	Released by the pituitary gland; it stimulates the ovarian follicle maturation, and it helps release estrogen later on
LH	Released by the pituitary gland; it helps the egg mature further to the point where it triggers the egg to be released during ovulation

Estrogen	Produced by the ovaries; it helps stimulate the maturation of the ovarian lining or the endometrium
Progesterone	Produces by the corpus luteum; it helps the shedding of the uterine lining (endometrium)
Estradiol	It helps mature ovarian follicles
Testosterone	It slightly increases during the surge of ovulation.

The duration of the menstrual cycle is around 28 days, and there are two phases: follicular (proliferation) phase and the luteal (secretory) phase. The follicular phase (Days 1-14) is the period in which active bleeding and shedding of the uterine lining happens. The luteal phase (Days 14-28) is the period where the uterine lining is thickening, and ovulation occurs (Reed et al., 2015). During the first day, estrogen is low, so LH and FSH are increased, this leads to the maturation of the follicle. By day seven, as the follicle matures, the level of estrogen is significantly increased which triggers the surge of LH, which leads to egg extrusion from its follicle shell in 3-4 days. After 28-36 hours from egg extrusion, ovulation starts to occur (day 12-15); this is the start of the luteal phase. The follicle shell transforms into the corpus luteum which produces high levels of progesterone. Progesterone is utilized for the thickening of the uterine lining (the endometrium). This phase is utilized to support a fertilized egg if pregnancy occurs. If pregnancy doesn't occur, the corpus luteum degrades, the uterine lining is shed, and the hormone levels decline 14 days after ovulation. This is when bleeding occurs ("The Menstrual Cycle," n.d.). During bleeding, prostaglandin is released by the endometrium, which causes the uterine smooth tissue to contract and the lining to shed. Prostaglandin synthetase inhibitors later decrease the volume of bleeding (Reed et al., 2015). Overall, thirty to forty milliliters of blood are lost during menstruation (Holland, 2018; Reed et al., 2015,).

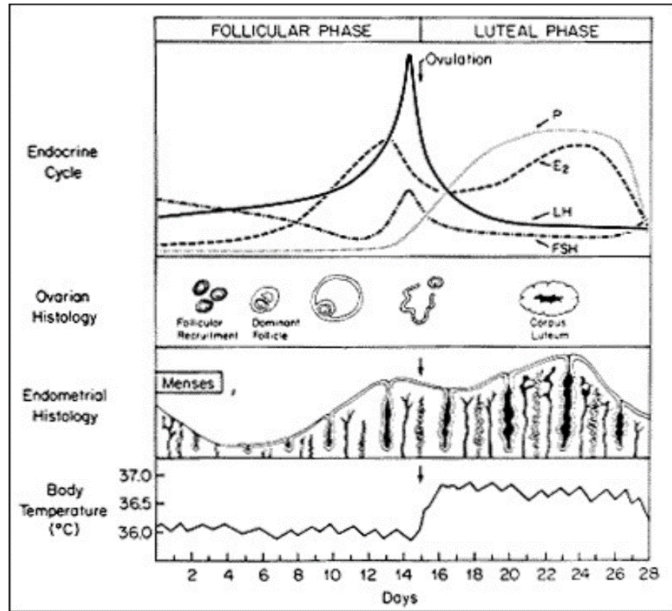


Figure 1: The Menstruation Cycle (from Reed et al., 2015)

In continuation, premenstrual syndrome (PMS) is usually associated with the time between ovulation and the beginning of menstruation (“PMS Relief,” 2018). During this time, cramps, pain, fatigue, breast tenderness, bloating, acne, and changes in emotional behaviors occur. Because of contraction of smooth muscle in the uterus, cramping and pain occurs in the lower abdomen. Fatigue is caused by the loss of blood that occurs. Breast tenderness and bloating is caused by the retention of excess water during this time. The excess fluid expands breast tissue causing nerves to stretch and the breast to feel tender. The same phenomenon occurs with bloating of the abdomen (Hirsch, 2013). Acne occurs within 50-80% of women during the premenstrual cycle (Palmer, 2018; Stolla et al., 2001). By stimulating sebaceous glands to produce excess oil, testosterone and progesterone produce red, inflamed papules on the cheeks, forehead, and other portions of the body (Palmer, 2018). Emotions vary due to hormonal imbalances during this time.

Female Puberty: A Mental Understanding

Physically and mentally, everything is changing during puberty. The mental aspect, though, is understated as it cannot be seen, like the physical transition. The exploration of this topic is necessary to understand an individual as a whole rather than as a piece.

Internally, the mind changes. As Dr. Joana de Vilhena Novaesputs states in “Mood Swings: How to Handle Emotional Changes During Puberty”, “Adolescence is a really unsteady time in which unpredictable physical changes accompany the emotional confusion and identity questions that come with becoming a young adult.” Mood swings and behavioral changes are a common occurrence during puberty, especially during menstruation as the brain is developing the “hypothalamic-pituitary-adrenal (HPA) axis reactivity, resulting in heightened stress-induced hormonal responses” (Romeo, 2013). From feeling sad to angry to happy, it may feel like everything is overwhelming at times. The limbic system is the emotional and behavioral regulator of the brain that may contribute to this change; structurally, the limbic system includes the amygdala, hippocampus, basal ganglia, and the hypothalamus (“The Limbic System,” 2019). The change in gonadal hormone production of estrogen and progesterone in females results in the release or inhibition of certain neurotransmitters that lead to the arrestation or intensification of emotions, behaviors, or both. Four of the most well-known neurotransmitters include: dopamine, serotonin, glutamate, and GABA. With the interaction of the structure and neurotransmitters, it causes emotional alterations (ex. sadness, happiness, irritability, anger...etc.), and behavioral changes (risk taking, sexual urges...etc.).

Foremost, during puberty and menstruation, estrogen (estradiol) and progesterone (progestin, allopregnanolone) influence the release or inhibition of neurotransmitters in parts of the limbic system for mood variations. When estrogen binds to amygdala receptors, it decreases dopamine release which can cause emotions to vary from fear to anger to other emotions (Arain et al., 2013). During the menstrual cycle, mood swings are very noticeable, especially during PMS. Progesterone activates GABAergic receptors, while estrogen inhibits them. When progesterone is present, GABAergic receptors are turned on to inhibit other responses which can cause anxiety (Barth, Villringer, & Sacher, 2015). Serotonin, “the happy chemical”, can be activated by progesterone and estrogen. Estrogen (estradiol) assures the serotonin is synthesized and maintained, and progesterone can increase serotonin neurotransmission by

regulating serotonin genes, but in a study done by Biegon et al. (1983), chronic progesterone decreased serotonin receptor expression in rats (Barth, 2015; Placzek, 2018).

Secondly, risk taking behaviors can take place, like excessive alcohol consumption, reckless driving, and other actions. The basal ganglia is one of the regions for the brain that is recognized for reward processing (“The Limbic System,” 2019). When estrogen interacts with the nucleus accumbens of the basal ganglia, dopamine (the pleasure neurotransmitter) release decreases, so to compensate, risk taking/ impulsivity is increased, as risky behaviors can increase dopamine. Additionally, before puberty, the glutamatergic receptors (excitatory) are developed, while the GABAergic receptors (inhibitory) are underdeveloped, so when puberty occurs, excitatory receptors dominate as inhibitory receptors are developmentally delayed. This can also increase risk taking behaviors (Arain et al., 2013).

Moreover, hormonal discrepancy can also cause depression. Depression “is a mood disorder that causes distressing symptoms that affect how you feel, think, and handle daily activities, such as sleeping, eating, or working” (“Depression,” 2018). It is 1.5- 3 times more likely to occur in women compared to men (Barth, 2015; Placzek, 2018). If serotonin is downregulated, it can cause general depression in PMS or severe depression in Premenstrual Dysphoric Disorder (PMDD). PMDD is an amplification of PMS symptoms that interfere with daily activities (Lobo & Pinkerton, 2010). If other hormones are unbalanced, it can also cause depression (Barth, 2015).

Psychologically, external factors such as social media, television, peers, family, and society can influence mental health for the better or for the worse. Self-esteem, for example, decreases when puberty occurs as bodies change drastically from breast development to hair growth to menstruation during this time. According to a research study conducted in 2005, “50- 88% of adolescent girls feel negatively about their body shape or size” (Huebscher, 2010), and according to McCabe et al. (2012), females are also less satisfied with their bodies compared to males. Peer competition contributes to body dissatisfaction to a higher caliber compared to television and social media, but later on in adolescence, social media has been shown to contribute more to body dissatisfaction than peer competition (Ferguson...et al., 2014).

Currently, technology including social media (Instagram, Facebook, Snapchat...etc.) and television show people who are on a standard that is not attainable for most people. A research study conducted by Sampasa-Kanyinga and Lewis (2015) showed a decline in mental health with children and adolescents who spent more than 2 hours on social networking sites (SNS). Additionally, familial and societal pressures make a large difference on how females portray their self-image. Negative parental or societal influences such as teasing, injustices, ignorance, societal norms, and familial models can decrease the female's self-esteem which can lead to mental and eating disorders (Helfert & Warschburger, 2013).

Overall, hormones and external factors can affect the mentality of females going through puberty, so understanding this aspect can make the transition through puberty easier for the individual and those surrounding her.

Resolving Issues Related to Puberty

Puberty is a difficult time for young females. Everything is changing physically and emotionally, and it seems like an awkward period that will not cease to exist. Even if it is temporary, there are some strategies that can be utilized to ease the transition from childhood to adulthood day by day.

Primarily, for breast development, when breasts grow, an individual's breasts might be painful and sensitive as breast tissue is stretching and developing. One aspect that can help is a bra. A bra will protect breast tissue, and it will provide support for developing breasts. Additionally, it can provide a level of comfort for young girls as bras cover the breast's natural shape with curved padding (Gavin, 2018).

Additionally, hair is more prevalent in the armpits, legs, pubic area, and the arms during this time. Shaving with a clean razor and shaving cream or waxing can help with the excessive hair.

With excessive oils and sweat production, acne and body odor can be an issue. For acne, washing your face can get rid of excess oils, so the skin appears less oily, but washing your skin too often can also cause facial irritation and dryness, so avoiding washing one's face too often is also necessary. Putting on

topical creams that contain benzoyl peroxide, salicylic acid or acetic acid can help. These acids and peroxides help with loosening and cleaning of pores as they dissolve fats (oils) in the skin, so acne is prevented (Harth, 2019). Also, allowing pimples to mature and burst on their own is far more beneficial than popping pimples. The reasoning behind this is, if a pimple is popped prematurely, it allows bacteria to penetrate deeper, which can lead to inflammation and permanent skin scarring (“Teenage Acne (Pimples): Types, Causes, Treatments,” 2019). Also, avoiding touching the face is important, so bacteria from hands is not transferred to the face which can cause acne. Additionally, putting on creams and makeup that can clog one’s pores can cause acne too, so avoiding heavy makeup is important. For moderate to severe acne, skin cleaners and topical creams can help, but it is not very effective, so going to the dermatologist can be very valuable. A doctor can recommend oral medications that help clear skin more effectively. Antibiotics, Isotretinoin (Amnesteem, Claravis, Sotret), anti-androgen agents, and other medications could also be prescribed. For teenagers, combined oral contraceptives can be utilized to regulate progesterone and estrogen levels which could help with acne (“Acne,” 2018; Palmer, 2018).

In continuation, body odor can also be an issue. There are many solutions for this issue. Predominantly, having good hygiene is essential, so taking a shower or a bath while using a combination of general cleaning products like soap, shampoo, body wash, conditioner or other products is important. Then, wearing clean, breathable clothes like cotton or other natural fabrics is beneficial; silk, polyester, and rayon are not breathable materials. Additionally, utilizing antiperspirants and deodorants can help with perspiration. Antiperspirants control sweating while deodorants control odor. If feet smell, using foot powder helps (“Body Odor,” 2017; “What's That Smell? Body Odor Means Puberty Is Starting,” 2017).

Moreover, the development in height and weight might cause “growing pains” as muscle and skeletal mass increase. Massaging and stretching muscles can assist with soreness and tenderness. Another option is using hot and cold packs to relieve these issues. A lifelong solution to decreasing pain is to correct bad posture (“Growing Pains,” 2015; “Growing Pains in Children: Causes, Symptoms, and Treatment,” n.d.).

Lastly with female puberty, the menstrual cycle causes a list of difficulties especially in association with premenstrual syndrome or PMS. For PMS, cramps, pain, breast tenderness, bloating, fatigue, acne, emotional fluctuations, and depression can occur. For pain, cramping, and breast tenderness, taking generic medicine like nonsteroidal anti-inflammatory drugs NSAIDS (naproxen, ibuprofen), Tylenol, and prostaglandins inhibitors can lower the feeling of pain and cramping internally (Crosta, 2017). Using heat packs can help externally. For bloating and fatigue, avoiding salty and high-carb foods, eating potassium-iron rich foods, eating natural or artificial diuretics (an object that increases urine output), drinking water, and exercising can decrease bloating and fatigue (Burgess, 2017). For acne, utilizing the same techniques as above works well. Long-lasting depression can be helped by using SSRIs (antidepressants) or GnRH agonists, but general depression can be helped by controlling hormones. For these symptoms, different types of contraceptives can be utilized to temporarily arrest the menstruation cycle which arrests the symptoms as well. Contraceptives control the hormones that result in the cycle- progesterone or estrogen. According to the NHS and Crosta, there are many contraceptives that are progesterone and estrogen based:

Contraceptive- Oral/ Injection	Progesterone-Based	Estrogen-Based
Depo-Provera Sayana Press or Noristerat	8-13 weeks- An injection of progesterone on the butt, arm, abdomen, or thigh- it makes periods lighter and PMS symptoms less severe	
Combined pill	*	Everyday pill*- contains oestrogen and progesterone- it makes periods lighter and PMS symptoms less severe
progestogen-only pill (POP)	Everyday pill- progesterone causes lighter but more frequent periods with spotting	
Contraceptive- Implant/ Patch		
NuvaRing	*	Monthly- a ring is inserted within the female's private to release oestrogen and progestogen- it makes periods lighter and PMS symptoms less severe
Patch	*	3 weeks*- patch releases hormones- oestrogen and progestogen- periods can become more regular, less painful, and lighter
Nexplanon (rod)	3 years- An implant that is inserted on the arm; it steadily releases progesterone which make periods less painful and heavy	
Intrauterine system (IUS)	3-5 years- A T-shaped implant that is inserted in the female's private- it releases progesterone to	

make periods lighter, shorter and less painful. After a year, menstruation may stop until the implant is taken out.	
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In continuation, menstruating or bleeding is a large aspect of the menstrual cycle. When menstruating, blood and tissue are lost. To contain this waste material, pads, menstrual cups, tampons, and period panties can be utilized to collect blood and tissues before the sanitary products are cleaned or discarded.

Overall, in puberty, the female body changes on a physical and mental level. There are ways to ease the transition through puberty by implicating simple mechanisms that can relieve some of negativities of puberty.

Incorporation of Female Puberty Education into *Girl Talk Inc.*

Within *Girl Talk Inc.*, there are many topics that are discussed for the mental development of the students from bullying to career development, but one aspect that is not discussed is the external and internal changes the female body goes through during puberty. To incorporate this knowledge, I designed a lesson plan that discusses this topic. This lesson plan will be implicated in one or two sessions for two age groups: 4-8th graders (elementary and middle schoolers) and high schoolers.

For elementary and middle schoolers in the first lesson, the material will broadly cover what puberty is, when it happens, and what happens physically and mentally, excluding the menstrual cycle. The second lesson will primarily focus on the menstrual cycle. A girl's period is a very taboo subject as it seems "gross," but the thing is, it is one of the most natural processes that happens. We will talk about what ages it can happen, what biologically happens during this time, what can be used to stop the bleeding, and what mechanisms can be used to relieve some of the symptoms of the cycle. For the menstruation cycle, we will be doing activities such as finding how much "blood" retention a tampon and a pad can have, and other activities.

For high schoolers, physical growth has already occurred, so the material will mainly focus on hormones and the menstrual cycle in both lessons. What happens physically and biologically during the menstrual cycle will be discussed in depth, as well as how to relieve some of the symptoms of PMS and what it is.

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Elementary and Middle School: Understanding Your Body

1. Finish week # journal entry and share.
2. Today, we are going to talk about your body and what happens at a biological and mental level during puberty, and what you can do to make the transition easier.

A. Ask the students questions:

- a. What is puberty?
- b. What happens to the body on the outside?
- c. Why do you sweat and smell?
- d. What happens mentally?

B. What happens Biologically and Mentally: (Hand out "YOUR BODY" handout)

- a. **Puberty**- it is the growth and development of the body. It usually starts between the ages of 8-14! It can happen at different times because of you are all different!
- b. **Everything is growing:**
 - **Breast Development:** Your body goes through 5 stages of breast development (Look at hand- and go over it)
 - **Problem (P):** It makes you boobs tender, sore, and hard, but it will be okay!
 - **Solution (S):** hot and cold packs, gentle massaging
 - **Hair Development**- your hair goes from vellus ("peach fuzz") to intermediate (medium) to terminal ("thick") hair, look at handout
 - P:** You may feel hairy, but it is okay!
 - S:** embrace your hair, or you can shave by waxing or using a clean razor
 - **Pimples**- Ache happens because the bacteria on your skin eats the oils that your body produces
 - P:** You have pus and blood coming out of little holes in your face or other parts of your body
 - S:** wash your face twice a day, put on ache medication on, avoid using heavy creams or products on your face
 - **Your body grows taller!** You bone grows nine centimeters per year at the peak
 - of puberty.
 - P:** Your body feels sore and tense
 - S:** stretch your body by exercising, massage your part f the body that is sore.
 - **You gain weight around your butt, thighs, legs, and stomach** During this time, your body gains 50% of a normal adult's weight
 - P:** You might feel heavy
 - S:** Just let your body gain weight! It is normal! Don't go on a diet because everything will even out!

C. Sweating and Smelling:

- **Sweat: During this time, you sweat from your armpits, your face, your back, and many other areas because your hormones increase which leads to your eccrine sweat glands producing sweat.**

- **P:** you might feel gross and sticky
- **TS:** Take a shower and use antiperspirant to lower sweat production
- **Body Odor: You might smell strange, and that is normal because hormones cause apocrine sweat glands to produce oily sweat which bacteria decomposes, so you smell.**
 - **P:** You might smell weird.
 - **TS:** Take a shower every day, put on deodorant, and wear cotton/ natural fabric clothes because it lets your body breath unlike manmade fabrics like polyester

D. Mentally: Everyone is going through change, so don't judge others about how they look because it can cause their self-esteem to decrease! This might make them sad, angry, and insecure about their bodies.

Use these statistics to emphasis this point:

- 50- 88% of adolescent girls feel negatively about their body shape or size.
- Females are less satisfied with their bodies compared to males.
- Depression is 1.5- 3 times more likely to occur in women compared to men
- Eating and mental disorders like anorexia (not eating), bulimia (puking stuff out), depression, and anxiety can occur.

Things that effect how a girl views her self during this time (Look at the handout) and what to realize:

Body Positivity Activity:

- Take a giant paper roll, and cut pieces out the size of each girl
- Allow the girls to outline their body and draw their insecurities about going through puberty.
- This might include acne, braces, sweat stains, odor, hair, breasts and so forth.
- Then let the students write positive things like "you are beautiful," or "you are kind."

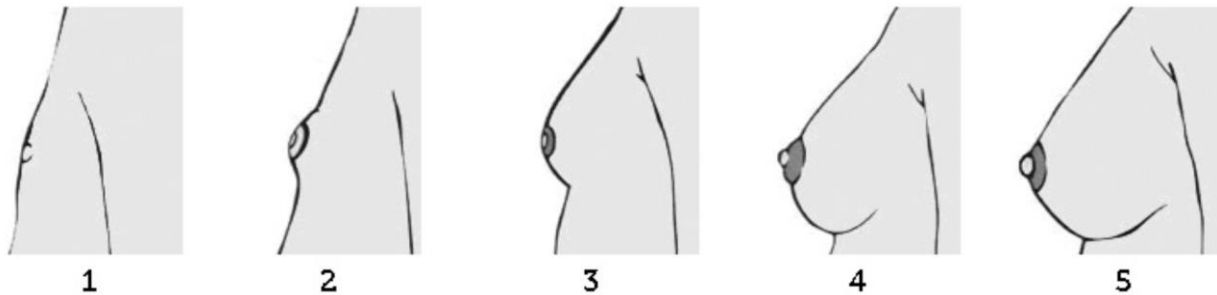
Takeaway:

- **Puberty is a weird and awkward process, but it is natural in a person's life, so embrace it! It will get better, so don't give up!**
- **It is so necessary to realize that you don't look like the person sitting next to you!**
- **You are different, so your body will be different too.**
- **You might be taller, skinner, chubbier, curvier or even flatter than your friend, but you are you, so stop caring what people say about you.**
- **You are beautiful!**

YOUR BODY

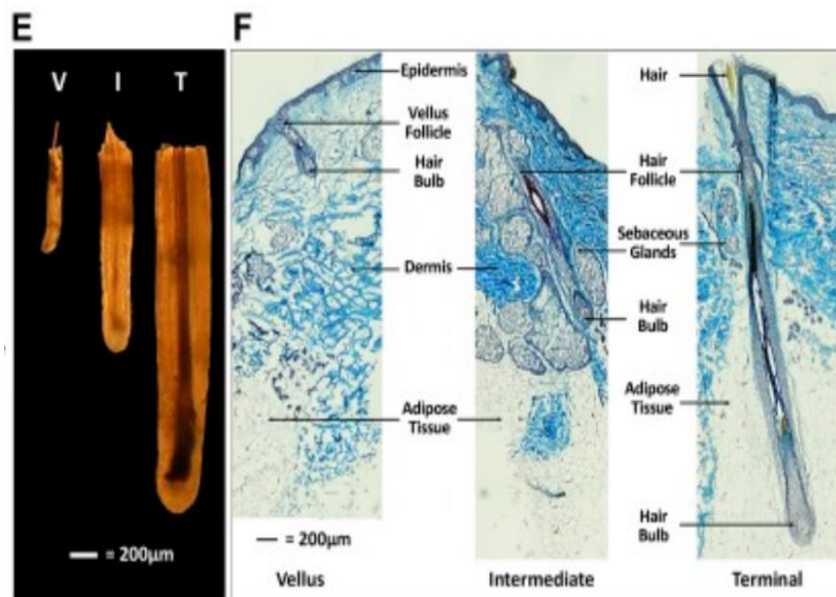
Breast Development:

Stages of Breast Development	
Stage 1	(Preadolescent) only the tip of the nipple is raised
Stage 2	Buds appear, breast and nipple raised, and the areola (dark area of skin that surrounds the nipple) enlarges
Stage 3	Breasts are slightly larger with glandular breast tissue present
Stage 4	The areola and nipple become raised and form a second mound above the rest of the breast
Stage 5	Mature adult breast; the breast becomes rounded and only the nipple is raised
By "Puberty: Adolescent Female." Stanford Children Health	

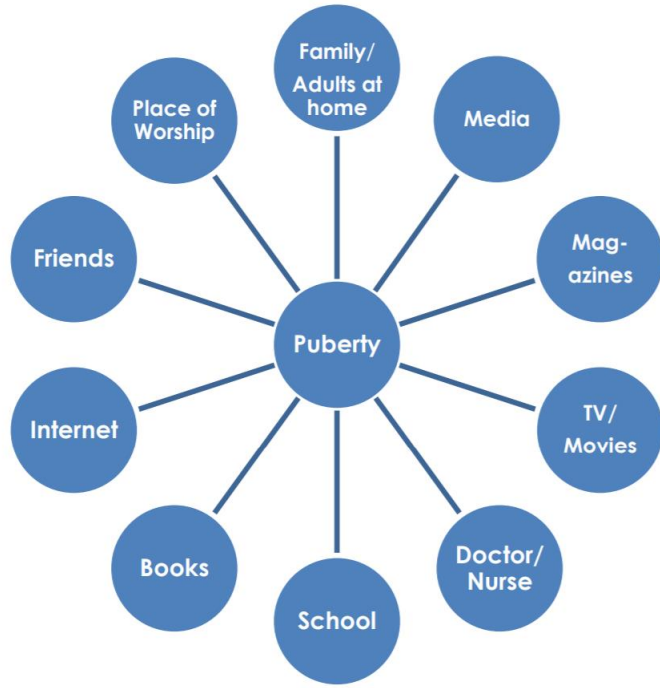


By: "Puberty," Young Women's Health

Hair Follicle Development:



64. (Miranda, 2017)



<https://www.toronto.ca/wp-content/uploads/2017/11/9830-CSD-March2017-Lesson1-AODA.pdf>

Elementary and Middle School: Understanding Your Body Part 2

1. Finish week # journal entry and share.
2. Today, we are going to talk about menstruation or periods.
3. Ask the girls:
 - **What is a menstrual cycle?**
- Answer: It is a 28-day cycle that leads the release of an egg from your ovaries, and the thickening of the uterine lining
 - **What is menstruation or a period?**
- This is the active bleeding that happens each month that usually lasts from 3 to 7 days.
 - **What age do periods happen?**
- Answer: Between the ages of 7-16
 - **When people say, "is it that of the month again," or "are you PMSing" what does that mean?**
 - -Answer: It means the female is having or going to have her period, a natural part of development in girls!
 - **What are the symptoms of having a period?**
-Answer: Down Below

Menstruation (Period)- A period normally lasts 3 to 7 day. You bleed 30-40 mL of blood every time you get your period. Here are the symptoms of having a period, why you have them, and how you can help with the symptoms

1. **Cramping and Pain**
 - **Why:** You have cramps because a little molecule called prostaglandins causes your uterus to contract.
 - **Symptom Control-** You can take ibuprofen, use hot and cold packs, take a hot shower, hug a pillow to compress the area, or sleep on your stomach.
2. **Emotional change/ Mood Swings**
 - **Why:** Hormones (estrogen and progesterone) in your body are imbalanced, so your moods can change from sadness to anger to other moods.
 - **Symptom Control-** Realize that hormones are making you feel this way, so talk to someone that you trust
3. **Breast Tenderness and Bloating**
 - **Why:** Your body's tissue holds onto water during this time, so it stretches you tissue which causes tenderness and soreness
 - **Symptom Control:** Avoid salty and high-carb foods, eat potassium-iron rich foods, eat natural or artificial diuretics (an object that increases urine output), drink water, and exercise.
4. **Fatigue**
 - **Why:** Your body is losing blood, so the cells that carry oxygen and have iron are being lost. When oxygen and iron is low, you can get anemic which can cause tiredness.
 - **Symptom control:** Avoid eating high-carb foods, drink water, eat iron-rich foods like spinach, and sleep

5. **Bleeding/ Blood clots**

- **Why:** Your body is trying to get rid of blood and tissue that has been building up on the days you weren't having your period. This means you bleed and shed your uterine lining or endometrium. It is normal to have clumps and blood coming out.

-**Symptom Control:** Use tampons, pads, menstrual cups, or period panties to collect the blood each day. Change the sanitary product every couple of hours.

Demonstrations:

- Show how much blood leaves the body when menstruation happens: cup containing 30-40 mL of water dyed red.
- Show how much liquid a pad and a tampon can hold and let them feel what component is used to hold the liquid.
- Demonstrate how to put a pad into a pair of underwear

Takeaways:

- Keep pads and tampons in your backpack, so you are ready if you or your friend need one.
- You can go to the nurse's office to get sanitary products
- Hand out a tampon and a pad to students

High School: Understanding Your Body Part 1 & 2

1. Finish week # journal entry and share.
2. Today, we are going to talk about menstruation or periods.
3. Ask the girls:
 - **What is menstrual cycle?**
- Answer: It is a 28-day cycle that leads the release of an egg from your ovaries, and the thickening of the uterine lining
 - **What is menstruation/ a period?**
- This is the active bleeding that happens each month that usually lasts from 3 to 7 days.
 - **What age do periods happen?**
- Answer: Between the ages of 7-16
 - **When people say, "is it that of the month again," or "are you PMSing" what does that mean?**
 - -Answer: It means the female is having or going to have her period, a natural part of development in girls!
 - **What are the symptoms of having a period?**
-Answer: Down Below

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-**Why:** You have cramps because a little molecule called prostaglandins causes your uterus to contract.
-**Symptom Control-** You can take ibuprofen, use hot and cold packs, take a hot shower, hug a pillow to compress the area, or sleep on your stomach.
2. **Emotional change/ Mood Swings**
-**Why:** Hormones (estrogen and progesterone) in your body are imbalanced, so your moods can change from sadness to anger to other moods.
-**Symptom Control-** Realize that hormones are making you feel this way, so talk to someone that you trust
3. **Breast Tenderness and Bloating**
-**Why:** Your body's tissue holds onto water during this time, so it stretches you tissue which causes tenderness and soreness
-**Symptom Control:** Avoid salty and high-carb foods, eat potassium-iron rich foods, eat natural or artificial diuretics (an object that increases urine output), drink water, and exercise.
4. **Fatigue**
-**Why:** Your body is losing blood, so the cells that carry oxygen and have iron are being lost. When oxygen and iron is low, you can get anemic which can cause tiredness.
-**Symptom control:** Avoid eating high-carb foods, drink water, eat iron-rich foods like spinach, and sleep

5. Bleeding/ Blood clots

-Why: Your body is trying to get rid of blood and tissue that has been building up on the days you weren't having your period. This means you bleed and shed your uterine lining or endometrium. It is normal to have clumps and blood coming out.

-Symptom Control: Use tampons, pads, menstrual cups, or period panties to collect the blood each day. Change the sanitary product every couple of hours.

A Greater Understanding of the Menstrual Cycle

- **The Menstrual Cycle-** it is a 28-day cycle where the body is getting ready for egg transplantation in case pregnancy occurs. It consists of two phases: follicular (proliferation) phase and the luteal (secretory) phase.

A. The Follicular Phase (Days 1-14)- the period in which active bleeding and shedding of the uterine lining happens; Estrogen dominates

B. The Luteal Phase (Days 14-28)- is the period where the uterine lining is thickening, and ovulation can occur; Progesterone dominates

Step-by-Step understanding (HAND OUT WORKSHEET):

1. During the first day, estrogen is low, so LH (luteinizing hormone) and FSH (follicle stimulating hormone) are increased, this leads to the maturation of the follicle (the premature egg)
2. By day seven, as the follicle matures, the level of estrogen is significantly increased which triggers the surge of LH, which leads to egg extrusion from its follicle shell in 3-4 days.
3. After 28-36 hours from egg extrusion, ovulation starts to occur (day 12-15); this is the start of the luteal phase.
4. The follicle shell transforms into the corpus luteum which produces high levels of progesterone. Progesterone is utilized for the thickening of the uterine lining (the endometrium). This phase is utilized to support a fertilized egg if pregnancy occurs.
5. If pregnancy doesn't occur, the corpus luteum degrades, the uterine lining is shed, and the hormone levels decline 14 days after ovulation.
6. This is when bleeding occurs. During bleeding, prostaglandin is released by the endometrium, which causes the uterine smooth tissue to contract and the lining to shed.
7. Blood and blot clots are excreted through the vagina for 3 to 7 days during the beginning of the follicular phase.

Why is this important?

- This topic is important because every female will go through it each month.
- Also, it is important to understand HOW contraception can help regulate your period if you decide to take it.

Contraceptives

- A contraceptive stops a female from getting pregnant, but it can stop or lessen the symptoms of menstruation. It does this by stopping periods, temporarily stopping estrogen surge which causes periods, or stopping shedding of progesterone. There are many types as listed to control your hormonal levels: (Look at handout).

Emotional Symptoms of the Menstrual Cycle and How Medicine Can Help:

Premenstrual Syndrome (PMS)- usually associated with the time between ovulation and the beginning of menstruation. During this time, cramps, pain, fatigue, breast tenderness, bloating, acne, and changes in emotional behaviors occur.

- **Mild Medication:**
 - a. NSAIDS (naproxen, ibuprofen)
 - b. Tylenol
 - c. Prostaglandins inhibitors

Premenstrual Dysphoric Disorder (PMDD)- it is an amplification of PMS symptoms that interfere with daily activities, so it can cause severe depression in some cases.

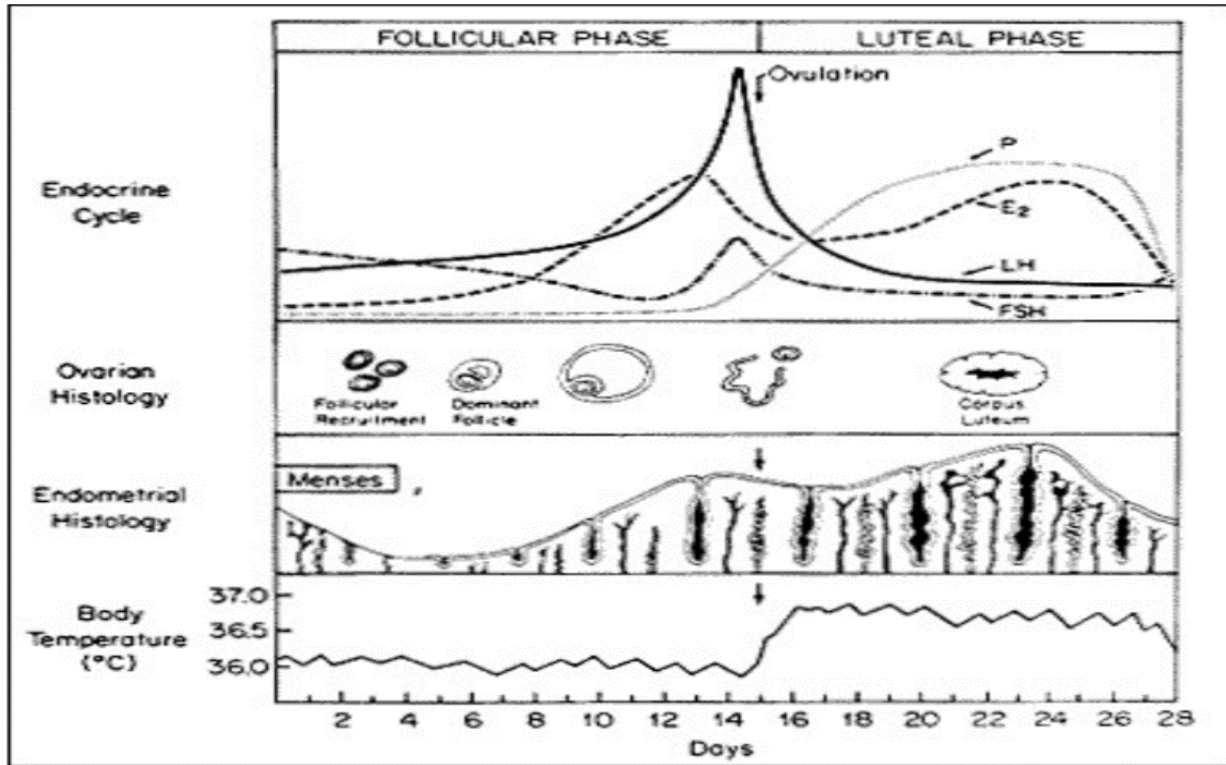
Depression- “is a mood disorder that causes distressing symptoms that affect how you feel, think, and handle daily activities, such as sleeping, eating, or working.”- (Depression. (2018, February). Retrieved from <https://www.nimh.nih.gov/health/topics/depression/index.shtml>)

- **Depression inhibiting Medications:**
 - a. SSRIs (antidepressants)
 - b. GnRH agonists

Takeaways:

- **The Menstrual Cycle is an important topic to discuss, because it lets you know HOW your body works.**
- **Being depressed, having anxiety, or having mood swings can happen during puberty and the menstrual cycle, so don't get too worried, but if it is severe to the point where you can't do regular activities, talk to a counselor, a doctor, or a person you trust.**

MENSTRUAL CYCLE AND SYMPTOM REGULATION MECHANISMS:



Contraceptive-Oral/ Injection	Progesterone-Based	Estrogen-Based
Depo-Provera Sayana Press or Noristerat	8-13 weeks- An injection of progesterone on the butt, arm, abdomen, or thigh- it makes periods lighter and PMS symptoms less severe	
Combined pill	*	Everyday pill*- contains oestrogen and progesterone- it makes periods lighter and PMS symptoms less severe
progestogen-only pill (POP)	Everyday pill- progesterone causes lighter but more frequent periods with spotting	
Contraceptive-Implant/ Patch		
NuvaRing	*	Monthly- a ring is inserted within the female's private to release oestrogen and progestogen- it makes periods lighter and PMS symptoms less severe

Emotional Symptoms of the Menstrual Cycle and How Medicine Can Help:

Premenstrual Syndrome (PMS)- usually associated with the time between ovulation and the beginning of menstruation. During this time, cramps, pain, fatigue, breast tenderness, bloating, acne, and changes in emotional behaviors occur.

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- **Depression inhibiting Medications:**
 - a. SSRIs (antidepressants)
 - b. GnRH agonists

If you are having an overwhelming emotion to the point you are debating self-harm, call the National Suicide Prevention Hotline to speak to someone anonymous at ANYTIME.

- **Number: 1-800-273-8255**

Values, Vision, and Mission (The VVM)

I am passionate about helping others. This passion can translate to a vision I want to achieve in the Knoxville Community: make Girl Talk an organization that incorporates the understanding of internal and external processes of female puberty for young female students. This can also translate to what I want to do in the future: be a doctor for women who need help.

At my time at University of Tennessee, my vision is to make Girl Talk an organization that incorporates the understanding of female puberty. This vision is influenced by my want to help young students, and my want to see this organization prosper. My overarching vision in the future is to be a doctor who aids women in poverty-stricken areas by specializing in obstetrics and gynecology. I want to be a doctor that women in poverty can come to without having to worry about paying too much money, so they can take better precautions when it comes to their health and situations and possibly the health of their future children. My vision is influenced by seeing women who don't have the ability to go to the hospital or get regular checkups because they can't afford it. The right to have a doctor to take care of a woman's needs shouldn't be improvised because of costs. This is what drives me to be a leader, a hardworking student, and an ambitious individual overall.

My values reflect my vision. I believe that all women have the right to take care of their health without improvising it for the cost of a doctor; women who are pregnant shouldn't compromise their health and the health of their child by not seeing a specialist in case something goes askew. I believe by changing the ability to have a doctor who is concerned about them, women will be more willing to take better precautions when it comes to their health, and possibly the health of their future children. For my recent goals, I value my ambition to see an organization and young ladies flourishing. I value women's health, change, ambition, and the rights of women; this has led to my vision. To see my vision through, I must first concentrate on improving myself through my values of hard work, determination, and leadership that will be needed to accomplish my current vision. Getting Girl Talk to incorporate female

puberty education into their 3-year curriculum will be challenging with the amount of time, energy, and knowledge a person must have, but I want to do it.

To accomplish my current year vision, I will have many challenges, and to accomplish my overarching vision, I will have even more challenges ahead of me. My mission is to assist with making a curriculum that incorporates female puberty education and women empowerment components into a three-year curriculum. This mission will help me have the ambition to overcome the obstacles that will appear. I must get good marks in all my classes to get a high enough GPA, and I must contact various events which is time-consuming. Another challenge I will have to overcome is taking on the various responsibilities of a leader. Gaining the ability to lead others by speaking and being interactive will be challenging for me, but I will do it as I am determined and hardworking! I will also need to learn to balance school, work, and family in the future as school isn't the only objective that I care about. For my overarching vision, some of the challenges I face include: encouraging other doctors to provide their services at a lower or no cost, getting the funds necessary to buy essential equipment and sanitary tools to perform certain procedures, and balancing time. Other obstacles will also come in the way, but as of right now, they are not as prominent to me in my current educational status as an undergraduate.

Overall, my vision, values, and mission are consistent with each other and those from last year to this year, but there are certain components I value today that I didn't value more before such as respect. The reason for this change is because I am older than before, so I learn from experience. It is going to be difficult to accomplish with the amount of time and commitment it will take, but I value change, women's health, women's rights, hard work, determination, and leadership too much to change my mind. My vision will be seen, heard, and accomplished even with the challenges I will encounter!

An Internal and External Understanding: Puberty Education for Female Students in *Girl Talk Inc.*

Shivani R. Patel

Background

For this project, I collaborated with a local organization called *Girl Talk Inc.* *Girl Talk Inc.* works with thirteen Knoxville-based schools to teach female students important life skills like career planning, relationships, bullying, and many more skills. I helped organize a section of their three-year curriculum to teach young female students about puberty. I created the lesson plan in Spring of 2019, and it will be implemented starting Fall of 2019.



Vision

To educate elementary, middle, and high school students about female puberty and how it affects them biologically and mentally.

Values

Understanding- the capacity to apprehend general relations of particulars

Health- the condition of being sound in body, mind, or spirit

Retention- a preservation of the aftereffects of experience and learning that makes recall or recognition possible

Mission

To encourage the learning and understanding of the mental and biological components of puberty and how to manage the symptoms and conditions that come along with it.

Research Implications

- Women make up 49.5% of the population on Earth.
- Puberty is the maturation of the body that occurs between the ages of 8-14 in female adolescences.
- Puberty is normally associated with breast development, hair growth, emotional and behavioral changes, menstruation, and other components.
- Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) are hormones produced when gonadotropin releasing hormone (GnRH) is released by the hypothalamus during the onset of puberty.
- There are five stages of breast development that occurs from pre-adolescence to adulthood.
- Objectives that can help with puberty: hygiene, sleep, proper diet, hot/cold packs, medicine...etc.
- Hormones (estrogen and progesterone) control the menstrual cycle, but symptoms associated with the hormones vary.

Program Synthesis

Two Programs Designed:

Elementary-Middle School-

For this age range, learning about the stages of breast development, hair growth, the symptoms of menstruation, and how to control the symptoms will be talked about through two activity sessions.

High School-

For this age range, the biological and behavioral examination of the body during puberty will be seen through two activity sessions.

Future Plans

- To measure retention, students will take a short matching survey to see whether information was retained.
- A comprehensive sheet will be provided for each age group, so a physical copy is present for each person.

References:

- <https://www.merriam-webster.com/>
- <http://girltalkinc.com/>
- Papalia, Diane E., Sally Wendkos Olds, and Ruth Duskin Feldman. Human development. McGraw-Hill, 2007.
- "Menstrual Cycle." Womenshealth.gov. 25 Apr. 2018. 02 Feb. 2019

Reflection

Recently, I have gotten involved in a fantastic organization called *Girl Talk Inc.* This organization is based on leading girls and teenagers on a path to be successful through empowerment and understanding of various topics. These girls come from many socioeconomic areas which can impact their ability to succeed, so this organization keeps these girls on a positive path.

For this past school year, I have had the privilege to volunteer with *Girl Talk Inc.* as a mentor, and it has been a very eye-opening blessing. Before this experience, I had never gotten to personally know such a diverse group of students who are younger than me. It was amazing to know how some of these students have experienced more in their nine to eleven years of life than I had in my twenty plus years. However, getting to know where these girls came from was one of the most interesting aspects. Some of these girls were from broken homes, some of them were in foster care, and some of them were struggling with depression. One thing that they all had in common was that they were there for *Girl Talk*. This is when I realized how important inclusivity and understanding was.

Once, while in class, we were discussing things that the students wished to learn in *Girl Talk*, and the topic of puberty came up. The girls vaguely knew what was going to happen, but they didn't know why or how it would happen. This is where I found that there was a need to educate these young students about female puberty. With the impact of technology, social media, and the need to act more "adult" these days, these young ladies want to look a certain way, but it is not possible due to different development and growth of each person. Additionally, during puberty, emotional fluctuation can occur, but this feature is not understood well either. Therefore, discussing female puberty is essential to allow for understanding of the pubertal internal and external components.

My project will focus on female puberty for this reason. I will be working with *Girl Talk Inc.* to incorporate the understanding of the internal and external component of female puberty to hopefully allow the students that are associated with this organization to learn more about their bodies on a mental

and physical level. Teaching them about this topic will allow for understanding about these issues in an informative way instead of having a stigma towards it.

As of right now, I have met with the coordinator and the leader of the organization to hopefully implicate this change to the curriculum in the semester/ years to come. The curriculum that is going to be made will be for an alternate three-year plan.

I will not be approaching the physical task of teaching alone, as there will be many other mentors who will teach the female puberty lesson plan. Fourth and fifth graders, middle schoolers, and high schoolers will be taught. I plan to survey both groups, and hopefully get collective data with other mentors' student data. I hope to utilize this to see whether retention is capable with both age ranges, or with just one. Hopefully, it will work with both, so the curriculum can be implicated starting next year and future years.

Overall, I hope to incorporate the topic of female puberty within the curriculum of *Girl Talk*, so the stigma of this topic can decrease. I will hopefully accomplish this with the leadership objectives I have learned in and out of class. Research, discussions, and understanding will guide the lesson plan to talk about the internal and external implications of female puberty such as depression, anxiety, breast development, hair growth, and many other topics.