PHYSIOLOGICAL BASIS OF SEXUAL BEHAVIOUR

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Introduction

Human sexuality, is a general term referring to various sexually related aspects of human life, including physical and psychological development, and behaviors, attitudes, and social customs associated with the individual’s sense of gender, relationships, sexual activity, mate selection, and reproduction. Sexuality permeates many areas of human life and culture, thereby setting humans apart from other members of the animal kingdom, in which the objective of sexuality is more often confined to reproduction. Human sexual behavior or human sexual practices or human sexual activities refers to the manner in which humans experience and express their sexuality. It encompasses a wide range of activities, such as strategies to find or attract partners (mating and display behavior), interactions between individuals, physical or emotional intimacy, and sexual contact.

01. History

In Europe and the United States, the scientific study of human sexuality began in the late 19th century during the Victorian Age, a time of repressive sexual norms. German psychiatrist Richard von Krafft-Ebing focused on what he considered to be the psychopathological problems of sex. Viennese physician Sigmund Freud, founder of psychoanalysis, considered sexuality central to his psychoanalytic theory. Havelock Ellis, an English physician, collected a wealth of information on sexuality from case histories, medical research, and anthropological reports.

The first work in his series Studies in the Psychology of Sex was published in 1896. His scientific objectivity foreshadowed modern sexology. Early in the 20th century, German physician Magnus Hirshfeld founded the first sex-research institute in Germany. He conducted the first large-scale sex survey, collecting data from 10,000 men and women.

He also initiated the first journal for publishing the results of sex studies, and started a marriage-counseling service. Most of his materials were destroyed by the Nazis during World War II (1939-1945).

In the early 1930s, American anthropologist Margaret Mead and British anthropologist Bronislaw Malinowski began collecting data on sexual behavior in other cultures. The most noted scientific studies of sexuality in the 20th century are those of American biologist Alfred Charles Kinsey and his colleagues and those of William H. Masters and Virginia Johnson. Kinsey began interviewing people about their sexual histories in 1938, and with his colleagues he published Sexual Behavior in the Human Male (1948) and Sexual Behavior in the Human Female (1953), based mostly on interviews with 5300 white men and 5940 white women.
Masters and Johnson began their clinical studies of the physiology of sexual response and sexual dysfunctions in the 1950s. These observations were published in Human Sexual Response (1966) and Human Sexual Inadequacy (1970), among others. Smaller studies have confirmed many of the findings of these pioneering sex researchers and have challenged certain others. The AIDS crisis has prompted a number of contemporary surveys of sex, including the National Health and Social Life Survey, the results of which were published in the book Sex In America (1994). As in any area of science, particularly relatively new and sensitive areas such as sex research, these studies have been criticized, on the basis of their findings and methodologies, but each study brings us closer to a fuller understanding of human sexuality.

02. Human Sexual Characteristics

Sexual characteristics are divided into two types. Primary sexual characteristics are directly related to reproduction and include the sex organs (genitalia). Secondary sexual characteristics are attributes other than the sex organs that generally distinguish one sex from the other but are not essential to reproduction, such as the larger breasts characteristic of women and the facial hair and deeper voices characteristic of men.

02.1 Sexual Development

There are two periods of marked sexual differentiation in human life. The first occurs prenatally and the second occurs at puberty. Although adult women and men may differ greatly in genital appearance and secondary sexual characteristics, they are almost identical during prenatal development. When an egg and a sperm unite during fertilization, they each bring to the new cell half the number of chromosomes (threadlike structures that contain genetic material) present in other cells. From fertilization through about the first six weeks of development, male and female embryos differ only in the pair of sex chromosomes they have in each cell—two X chromosomes (XX) in females and one X and one Y chromosome (XY) in males. At this stage, both male and female embryos have undifferentiated gonads (ovaries or testes), two sets of ducts (one set capable of developing into male internal organs and the other into female organs), and undifferentiated external genital folds and swellings.

02.1 a. Prenatal Sexual Development

About six weeks after conception, if a Y chromosome is present in the embryo’s cells (as it is in normal males), a gene on the chromosome directs the undifferentiated gonads to become testes. If the Y chromosome is not present (as in normal females), the undifferentiated gonads will become ovaries. These androgens stimulate development of the one set of the genital ducts into the epididymes, vas deferens, and ejaculatory duct. The presence of androgens also stimulates development of the penis and the scrotum. The testes later descend into the scrotum. Males also produce a substance that inhibits the development of the second set of ducts into female organs. In the absence of such hormonal stimulation, female structures develop.

Prenatal hormones also play a role in the sexual differentiation of the brain. For example, prenatal hormones direct the development of sex differences in some cells and the neural pathways
in the hypothalamus (the part of the brain that controls the endocrine system). Beginning at puberty, based on prenatal sexual differentiation, the hypothalamus directs either the cyclic secretion of sex hormones that controls the female menstrual cycle or the relatively continuous production of male sex hormones.

Other brain differences may be related to differences in sexual and aggressive behavior or in cognitive and perceptual characteristics. Most of the research on sexual differentiation of the brain has been performed with animals or with biased human samples, and there is much debate about the nature and behavioral relevance of these differences in humans.

02.1 b. Postnatal Sexual Development

After birth, the process of sex-role socialization begins immediately. There may be small, physiologically-based differences present at birth that lead girls and boys to perceive the world or behave in slightly different ways. There are also well-documented differences in the ways that boys and girls are treated from birth onward. The behavioral differences between the sexes, such as differences in toy and play preference and in the degree of aggressive behavior, are most likely the product of complex interactions between the way that the child perceives the world and the ways that parents, siblings, and others react to the child. The messages about appropriate behavior for girls and boys intensify differences between the sexes as the child grows older.

As the first bodily changes of puberty begin, sometime from the age of 8 to the age of 12, the child may become self-conscious and more private. Because preadolescents tend to play with others of their own sex, it is not at all uncommon that early sexual exploration and experience may happen with other members of the same sex.

02.2 Sexual orientation

Sexual orientation may become a question during puberty or adolescence. The term sexual orientation refers to a person’s erotic, romantic, or affectional attraction to the other sex, the same sex, or both. A person who is attracted to the other sex is labeled heterosexual, or sometimes straight. A person attracted to the same sex is labeled homosexual. The word gay may be used to describe homosexuals and is most often applied to men, whereas the term lesbian is applied to homosexual women. A person who is attracted to both men and women is labeled bisexual. A transsexual is a person whose sense of self is not consistent with his or her anatomical sex—for example, a person whose sense of self is female but who has male genitals. Homosexuality is not synonymous with transsexuality. Homosexual men’s sense of self is male and lesbian women’s sense of self is female.

03. Physiology of sex

Understanding the processes and underlying mechanisms of sexual arousal and orgasm is important to help people become more familiar with their bodies and their sexual responses and to assist in the diagnosis and treatment of sexual dysfunctions. Nevertheless, it was not until the work of American gynecologist William H. Masters and American psychologist Virginia Johnson...
that detailed laboratory studies were conducted on the physiological aspects of sexual arousal and orgasm in a large number of men and women.

Based on data from 312 men and 382 women and observations from more than 10,000 cycles of sexual arousal and orgasm, Masters and Johnson described the human sexual response cycle in four stages: excitement, plateau, orgasm, and resolution.

03.1 Sexual Response Cycle

03.1 a Excitement

The excitement stage of sexual arousal is characterized by increased blood flow to blood vessels (vasocongestion), which causes tissues to swell. Both women and men may develop “sex flush” during this or later stages of the sexual response cycle, although this reaction appears to be more common among women. Sex flush usually starts on the upper abdomen and spreads to the chest. In addition, pulse rate and blood pressure increase during the excitement phase.

03.1 b Plateau

During the plateau stage, vasocongestion peaks and the processes begun in the excitement stage continue until sufficient tension is built up for orgasm to occur. Breathing rate, pulse rate, and blood pressure increase.

03.1 c Orgasm

Orgasm, or climax, is an intense and usually pleasurable sensation that occurs at the peak of sexual arousal and is followed by a drop in sexual tension. Not all sexual arousal leads to orgasm, and individuals require different conditions and different types and amounts of stimulation in order to have an orgasm. Orgasm consists of a series of rhythmic contractions in the genital region and pelvic organs. Breathing rate, pulse rate, and blood pressure increase dramatically during orgasm.

03.1.d Resolution

During resolution, the processes of the excitement and plateau stages reverse, and the bodies of both women and men return to the unaroused state. The muscle contractions that occurred during orgasm lead to a reduction in muscular tension and release of blood from the engorged tissues. Resolution generally takes from 15 to 30 minutes, but it may take longer, especially if orgasm has not occurred.

04. Sexual Behaviours

The reason why and how humans and other animals engage in the 3C’s – courting, copulating and cohabitating has not been well studied. Still it is seen that all sexual/reproductive behavior have 4 stages in their completion. They are Sexual Attraction, Appetitive Behaviour, Copulation, and Post Copulatory Behaviour.

04.1 a Sexual Attraction

Sexual attraction is the first step in bringing the male and female together. Physical attributes, pheromones/hormonal action, postures, gestures, eye contact, verbal/ non verbal communication etc.,
are seen to initiate this stage. Once mutually attracted, the pair may progress to the second stage of appetitive behaviours.

04.1 b Appetitive Behaviour

These behaviours establish, maintain, or promote sexual interaction. The female mammal that engages in such behaviour is said to be *proceptive*. Male behaviours usually consist of staying near the female. If both exhibit such behavior they may progress to the next stage of mating.

04.1 c Copulation

Also termed as *coitus*. It refers to the act that sexual species engage in to provide the male’s semen to the female. There occurs the insertion of the male genitalia into the female genitalia. This behavior of insertion is referred to as *Intromission*. After copulation they will not mate again for some period of time, which is called *Refractory period*.

04.1. d Post Copulatory Behaviour

These behaviours are varied across species and not so expressed in humans. Parental behaviours like egg laying, incubation, feeding squabs etc., are seen in other animals.

05. Hormones and their Impact

Sex Hormone, is any of the several chemical substances that affect the development and functioning of the reproductive system in vertebrates, or animals with a backbone. The sex hormones are divided into three major groups: gonadotropins, gonadal hormones, and lactogens. Gonadotropins stimulate the gonads, which are sperm- or egg-producing organs. The male gonads are the testes, which produce sperm, and the female gonads are the ovaries, which produce eggs. Gonadotropins are secreted by the pituitary gland, which is located in the center of the brain and is controlled by an area of the brain known as the hypothalamus. Gonadotropins, such as the luteinizing hormone (LH) and the follicle-stimulating hormone (FSH) in females and the interstitial cell-stimulating hormone (ICSH) in males, control the development and functions of the ovaries and testes, including menstruation and sperm production. Gonadal hormones such as estrogen, progesterone, and testosterone are secreted primarily by the testes and ovaries, placenta (the sac of nutritive tissue that supports and protects the fetus), and adrenal glands.

Their chief function is to regulate the development of the secondary sex characteristics such as deepening of the voice in males and distribution of body hair (see also Human Sexuality). The third group, the lactogens, are secreted by the pituitary gland and are necessary for the secretion of milk in the mammary glands of mammals. They are also believed to affect maternal behavior patterns. Sex hormones regulate the development of sexual organs, sexual behavior, reproduction, and pregnancy. Another gonadotropin called luteinizing hormone regulates the production of eggs in women and the production of the male sex hormone testosterone. Produced in the male gonads, or testes, testosterone regulates changes to the male body during puberty, influences sexual behavior, and plays a role in growth. The female sex hormones, called estrogens, regulate female sexual development and behavior as well as some aspects of pregnancy. Progesterone, a
female hormone secreted in the ovaries, regulates menstruation and stimulates lactation in humans and other mammals.

The *hormonal theory of sexuality* holds that, just as exposure to certain hormones plays a role in foetal sex differentiation, such exposure also influences the sexual orientation that emerges later in the adult. Foetal hormones may be seen as the primary determiner of adult sexual orientation, or a co-factor with genes and/or environmental and social conditions. There is evidence of a correlation between sexual orientation and traits that are determined *in utero*. Williams *et al.* (2000) found that finger length ratio, a characteristic controlled by prenatal hormones, is different in people of distinct sexual orientations. Another study by McFadden in 1998 found that auditory systems in the brain, another physical trait influenced by prenatal hormones is different in those of differing orientations.

In a 1991 study, Simon LeVay demonstrated that a tiny clump of neurons of the anterior hypothalamus—which is believed to control sexual behavior and linked to prenatal hormones—was on average more than twice the size in heterosexual men when contrasted to homosexual men. Few well-controlled scientific studies have ever been published suggesting the possibility of pheromones in humans. The best known case involves the reported synchronization of menstrual cycles among women based on unconscious odor cues (the *McClintock effect*, named after the primary investigator, Martha McClintock, of the University of Chicago). This study exposed a group of women to a whiff of perspiration from other women. It was found that it caused their menstrual cycles to speed up or slow down depending on the time in the month the sweat was collected; before, during, or after ovulation. Therefore, this study proposed that there are two types of pheromone involved: “One, produced prior to ovulation, shortens the ovarian cycle; and the second, produced just at ovulation, lengthens the cycle”. However recent studies and reviews of the McClintock methodology have called into question the validity of her results.

### 06. External cues

Animals use a variety of visual, auditory, and chemical signals throughout courtship and mating. Some are important for identification—firefly species, for example, are remarkably similar, and during courtship, each species sends out a unique pattern of flashes to signal its identity to potential mates. Frogs use a vocal Morse code for species recognition, and birds sing different kinds of songs to announce their species identity. *Visual cues* often help animals locate each other in habitats with dense vegetation. The black and white markings of pandas, for instance, help individuals stand out in the thick bamboo forests where they live. *Audio cues* are also used to help animals find each other. The very low sounds of a male elephant, inaudible to human ears, are a beckoning call that females can hear up to 4.8 km away. Chorusing bullfrogs, bugling elk, and warbling songbirds build a fence of sound that warns off competing males, while enticing females to check out the territory.

Recently, there has been huge interest in studying *Human behavioral cues* that could be useful for developing an interactive and adaptive human-machine system. Unintentional human gestures such as making an eye rub, a chin rest, a lip touch, a nose itch, a head scratch, an ear
scratch, and a finger lock have been found conveying some useful information in specific context. Some researchers have tried to extract such gestures in a specific context of educational applications. Chemical cues called pheromones bring together individuals that are separated by miles. A male silk moth, for example, can detect the female’s invitational pheromones at a distance of up to 11 km. Many fish species, highly sensitive to chemicals in the water, secrete pheromones to locate mating partners. Pheromones can also indicate fertility to a prospective mate. The female giraffe secretes pheromones in her urine that are detected by the male. These pheromones announce her fertility and signal the correct timing for courtship and mating.

Other studies have suggested that people might be using Odour cues associated with the immune system to select mates who are not closely related to themselves. Using a brain imaging technique, Swedish researchers have shown that homosexual and heterosexual males’ brains respond differently to two odors that may be involved in sexual arousal, and that the homosexual men respond in the same way as heterosexual women, though it could not be determined whether this was cause or effect. The study was expanded to include homosexual women; the results were consistent with previous findings meaning that homosexual women were not as responsive to male identified odors, while their response to female cues was similar to heterosexual males.

In 2008, it was found using functional magnetic resonance imaging that the right orbitofrontal cortex, right fusiform cortex, and right hypothalamus respond to airborne natural human sexual sweat. Courtship and mating behaviors are often triggered by physiological changes set in motion by changes in the environment. For instance, longer daylight hours, warmer temperatures, or other Environmental cues in the spring may trigger multiple hormonal fluctuations. These varying hormone levels may produce territoriality in males or nesting behavior in females.

07. Brain and sexual behaviour

Recent research in brain function suggests that there may be sexual differences in both brain anatomy and brain function. One study indicated that men and women may use their brains differently while thinking. Researchers used functional magnetic resonance imaging to observe which parts of the brain were activated as groups of men and women tried to determine whether sets of nonsense words rhymed. Men used only Broca’s area in this task, whereas women used Broca’s area plus an area on the right side of the brain. A number of sections of the brain have been reported to be sexually dimorphic; that is, they vary between men and women. There have also been reports of variations in brain structure corresponding to sexual orientation. In 1990, Swaab and Hofman reported a difference in the size of the suprachiasmatic nucleus between homosexual and heterosexual men. In 1992, Allen and Gorski reported a difference related to sexual orientation in the size of the anterior commissure.

Conclusion

In some cultures sexual activity is considered acceptable only within marriage, although extramarital sex still takes place within such cultures. Some sexual activities are illegal either universally or in some countries, and some are considered against the norms of a society. For
example, sexual activity with a minor is a criminal offense in many jurisdictions, as is sexual abuse of individuals in general. Human sexual behavior, like many other kinds of activity engaged in by human beings, is generally governed by social rules that are culturally specific and vary widely. These social rules are referred to as sexual morality (what can and can not be done by society’s rules) and sexual norms (what is and is not expected). People commonly display sexual interest in other people via body language, although the precise form and degree vary by culture, era, and sex. Some of the cues to signal interest include exaggerated gestures and movement, echoing and mirroring, room encompassing glances, leg crossing, the pointing knee, hair tossing or touching, head tilt, rotation of the pelvis, showing wrists, adjusting clothes, laughing and smiling, eye contact, touching, playfulness, and proximity. Humans also demonstrate physiological cues when sexually aroused such as pupil dilation

References

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