

Sexual Interest (“Addiction”) & Sexual Bonding (“Glueing”) — The Surprising Revelations of Recent Neuroscience Discoveries



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Kids – on Love and Marriage



Concerning Why Love Happens Between Two Particular People

Jan, age 9: “No one is sure why it happens, but I heard it has something to do with how you smell. That’s why perfume and deodorant are so popular.”



On What Falling In Love Is Like

Leo, age 7: “If falling in love is anything like learning how to spell, I don’t want to do it. It takes too long.”

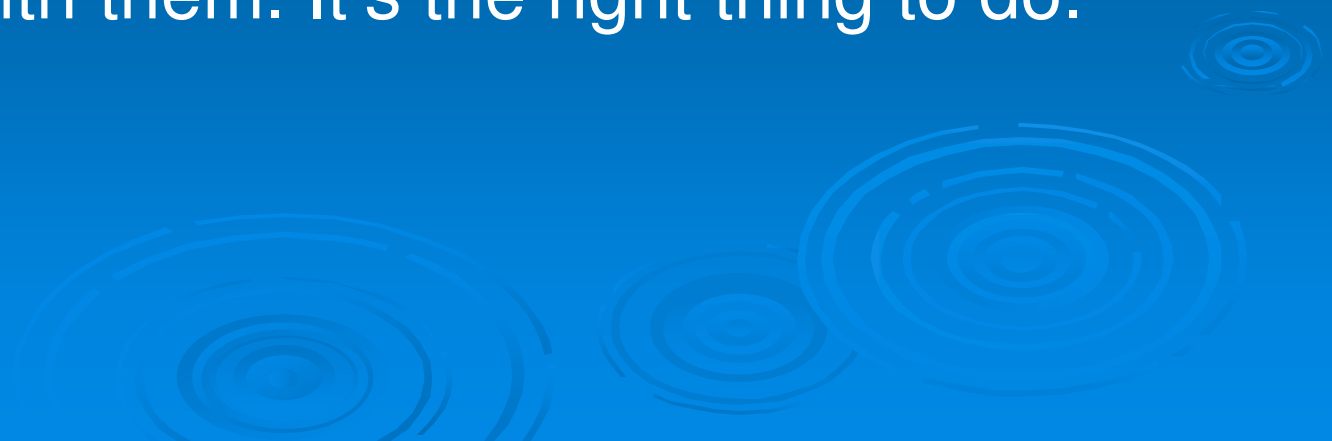
Dave, age 8: “Love will find you, even if you are trying to hide from it. I been trying to hide from it since I was five, but the girls keep finding me.”



On When It Is Ok to Kiss Someone

Kally, age 9: “Never kiss in front of other people. It’s embarrassing. But if nobody sees you, I might be willing to try it with a handsome boy, but just for a few hours.”

Howard, age 8: “The rule goes like this: If you kiss someone, then you should marry them and have kids with them. It’s the right thing to do.”



On How To Decide Who To Marry

Kirsten, age 10: “No person really decides before they grow up who they’re going to marry. God decides it all way before, and you get to find out later who you’re stuck with.”



How To Make Love Endure

Ricky, age 7: “Tell your wife she looks pretty, even if she looks like a truck.”

Roger, age 8: “Don’t forget your wife’s name...that will mess up the love.”



- But they grow into adolescents and young adults and cause us to ask some questions....



- Why do young people sometimes do such stupid things, including of course, us, when we were young?
- And more serious questions such as...



- Why do people who have had sex usually continue to seek out sex — married or not?
- So, is sex addicting?



- Why do the risks of pregnancy, STD, abuse, and emotional damage, not always deter males and females from sexual involvement?
- Is emotional bonding between people who have had sex really that strong?



- Why are some girls so strongly attracted to some guys?
- Is there chemical attraction that draws them unknowingly?



- What is it that can hold a married couple together for twenty years, thirty years or even more?
- What enables such a couple, sometimes after having sexual intercourse to say “it is a miracle that we have been doing this so long and still enjoy it so much”



Modern Neuroscience has Given Us Some Answers

- through brain imaging
- through neurochemical analysis



Modern Imaging has “Opened” the Brain for Study

- MRI (Magnetic Resonance Imaging)
 - utilizes magnets instead of x-ray
 - Can therefore be done repetitively on an individual without brain damage
- fMRI (Functional MRI)
 - functioning brain tissue utilizes oxygen. Increased blood flow to an area of the brain that has become active can be detected by fMRI.

Modern Imaging has “Opened” the Brain for Study (cont.)

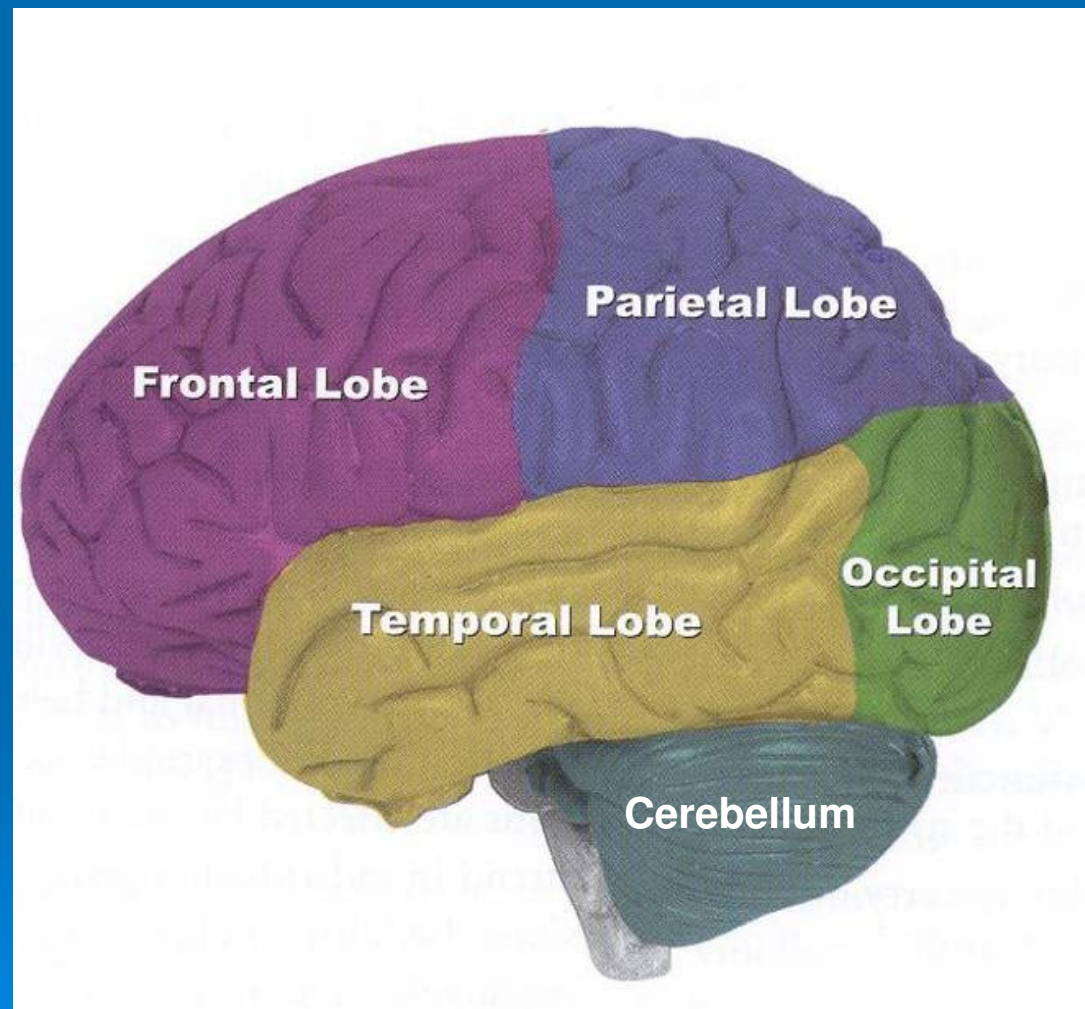
➤ PET (Positron Emission Tomography)

- a patient is given a safe dose of a positron emitting radioisotope on a metabolically active molecule.
- for brain function study FDG (fluorodeoxyglucose), a modified glucose molecule is often used. PET detects active areas of the brain by identifying concentration of isotope in those areas.

Modern Neurochemical Analysis

- More than 100 have been identified
- Many more probably exist
- Receptors must be present in the brain for these substances to be active – the more receptors, the more active.
- Within our skulls is an organ, our brain, that is a “cauldron” of chemicals, surging, diminishing and surging again affecting what we think, what we do and even as they do that significantly influencing (“molding”) the final physical structure of our brains and therefore our future thought and behavior.

Lobes of the Human Brain



Anterior ← → Posterior

The Brain

- Three pounds
- 10 billion neurons
- 100 billion support cells
- 100 trillion connections
(more than all of the internet connections in the world)

- The discovery that the prefrontal cortex is not fully mature till the mid-twenties¹ is one of the startling findings of modern brain imaging
- This helps answer one of our questions — “Why do young people sometimes do such stupid things?”

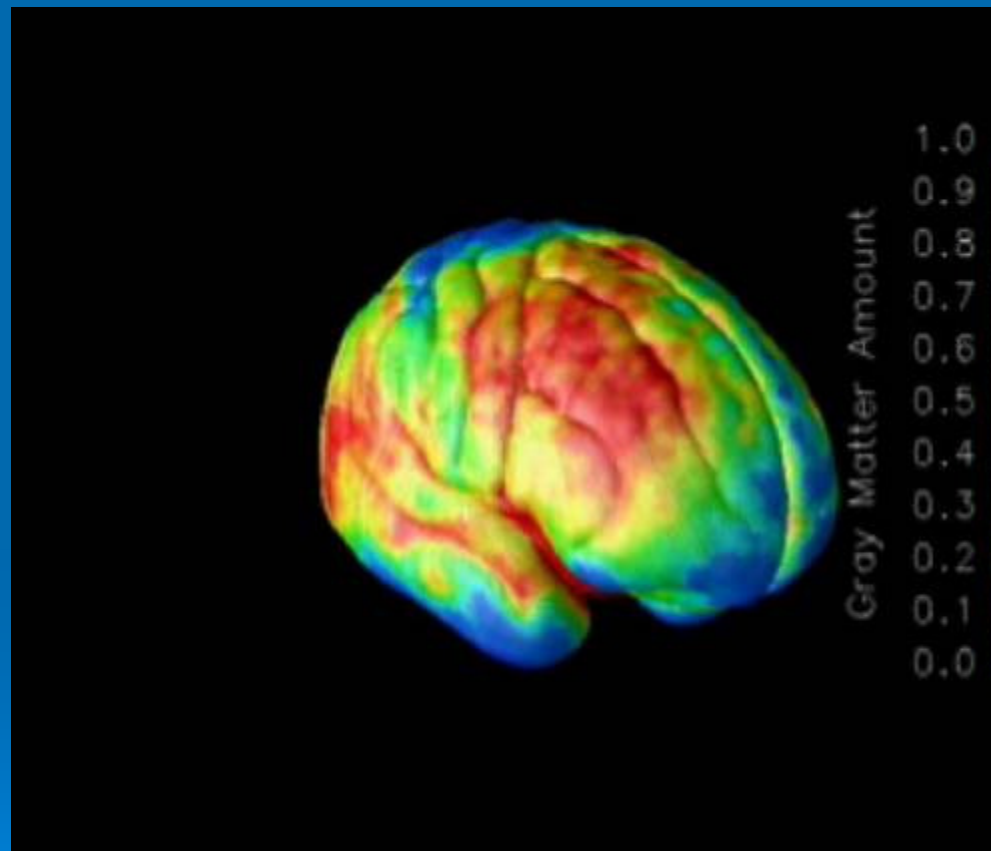
1. Giedd, et al. Nature Neuroscience, 1999

The prefrontal cortex is the source of:

- Judgment
- Seeing into the future
- Seeing how behavior can affect the future
- Moral intelligence
- Abstract thinking
- Seeing what is not obvious
- Planning for the future
- Rational behavior and decision making
- Understanding rules of social conduct¹

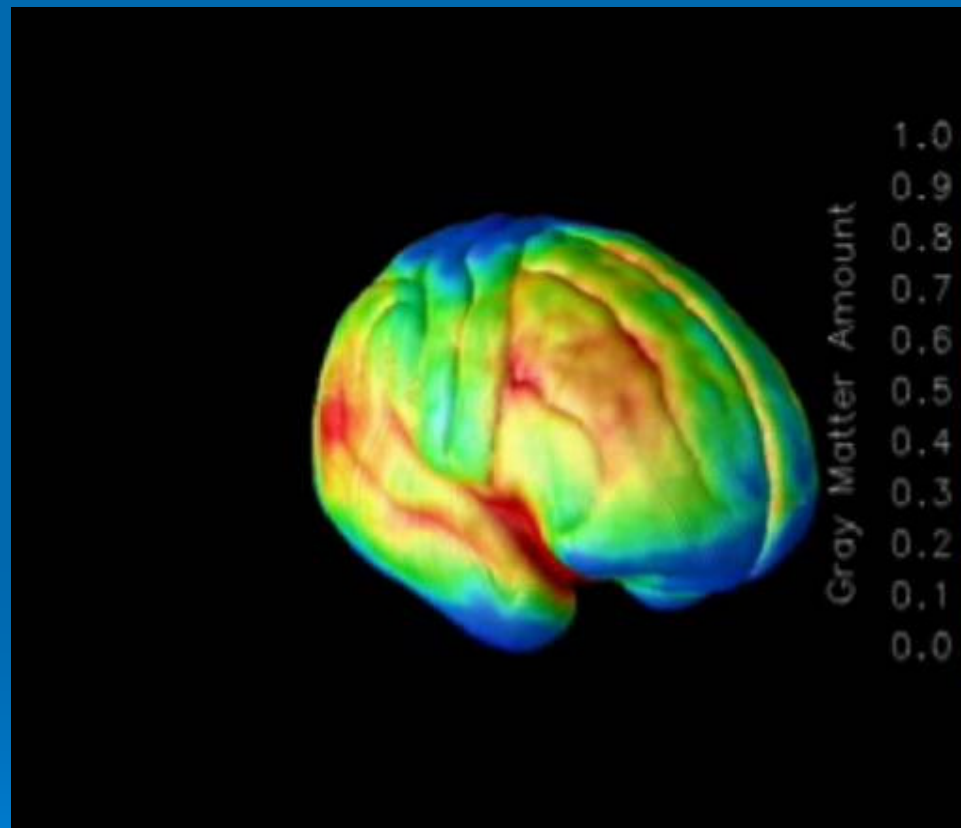
1. Weinberger, et al. The Adolescent Brain, 2005

Brain Development – Age 5



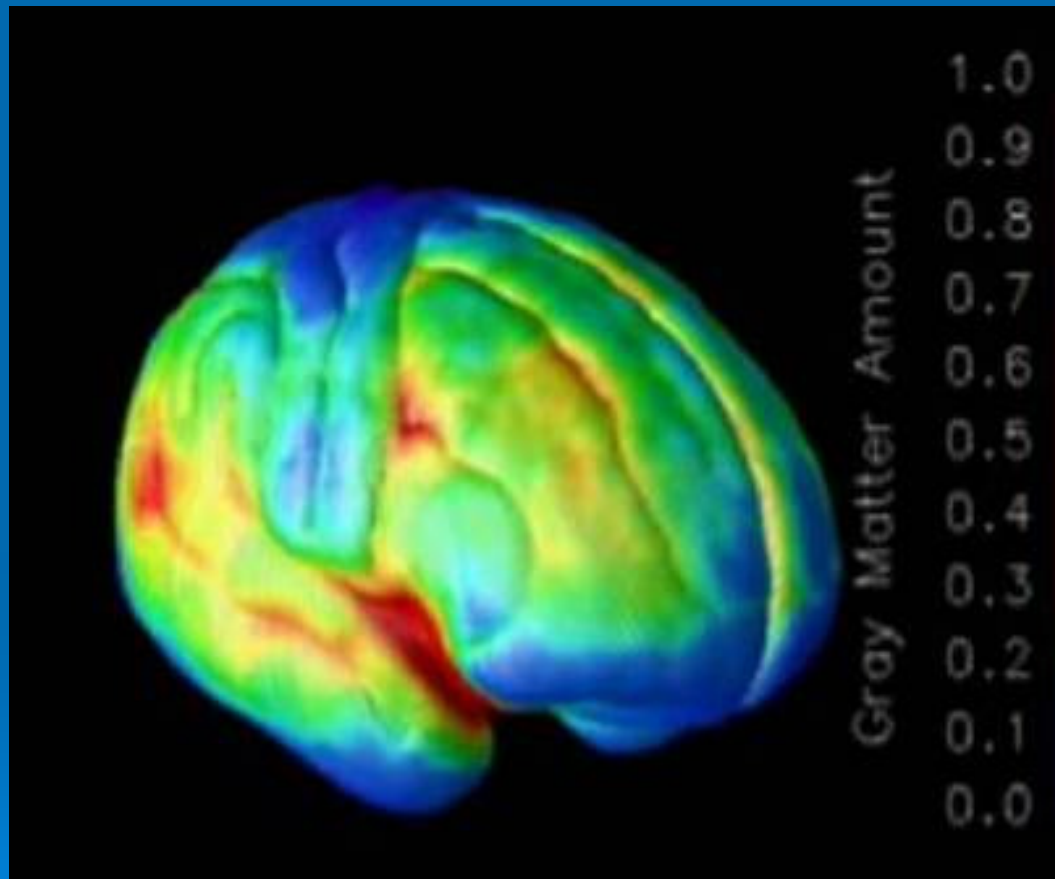
Images courtesy of Jay Giedd, MD, National Inst of Mental Health

Brain Development – Age 8



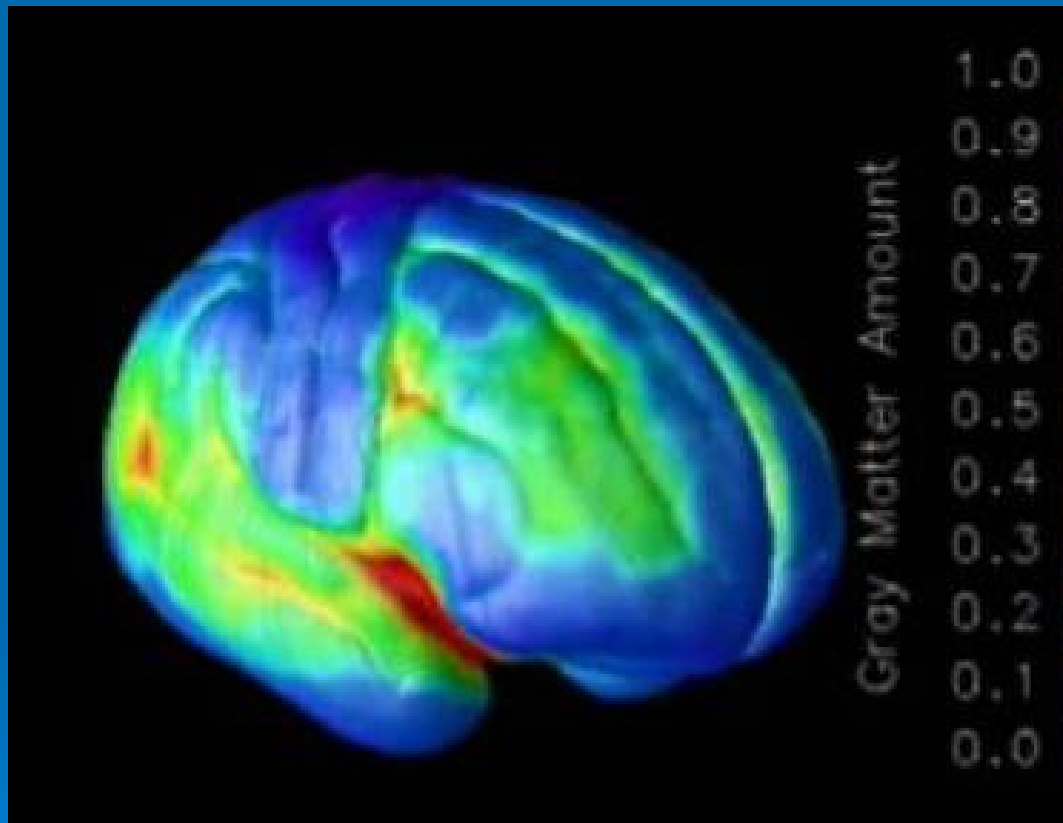
Images courtesy of Jay Giedd, MD, National Inst of Mental Health

Brain Development – Age 12



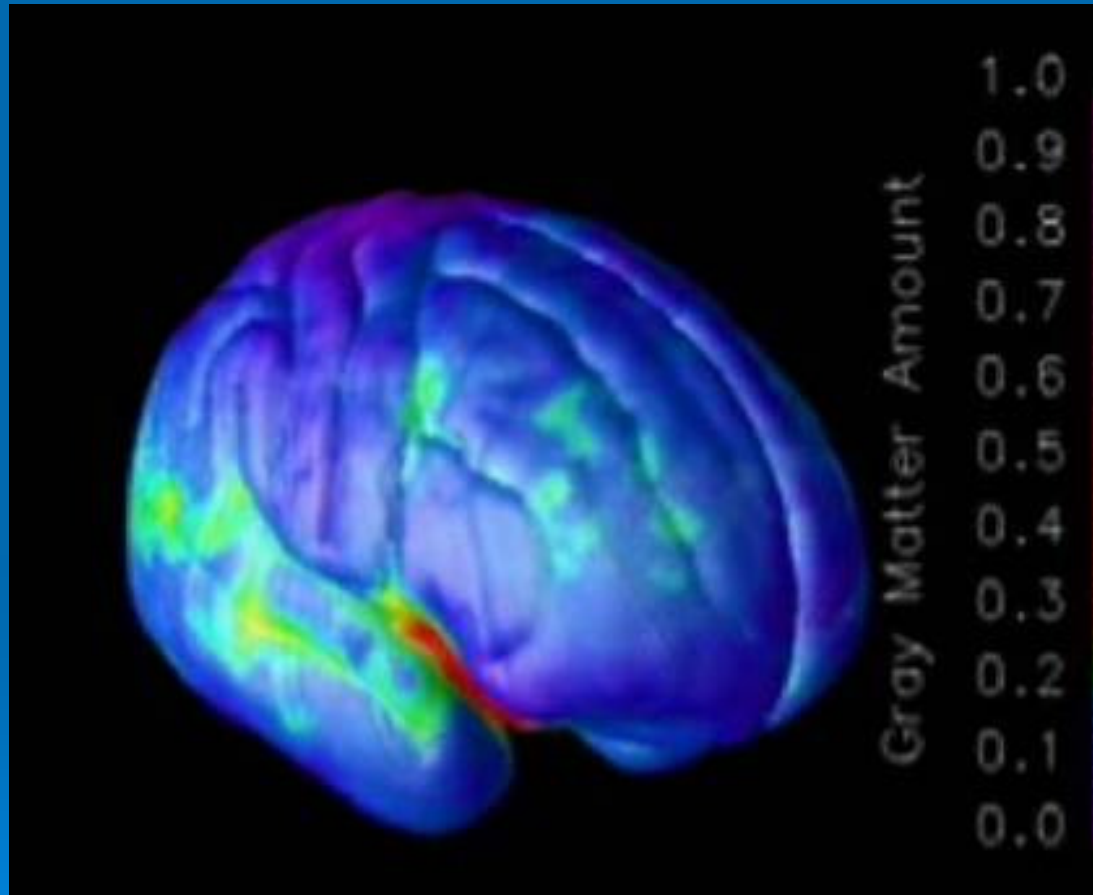
Images courtesy of Jay Giedd, MD, National Inst of Mental Health

Brain Development – Age 16



Images courtesy of Jay Giedd, MD, National Inst of Mental Health

Brain Development – Age 20

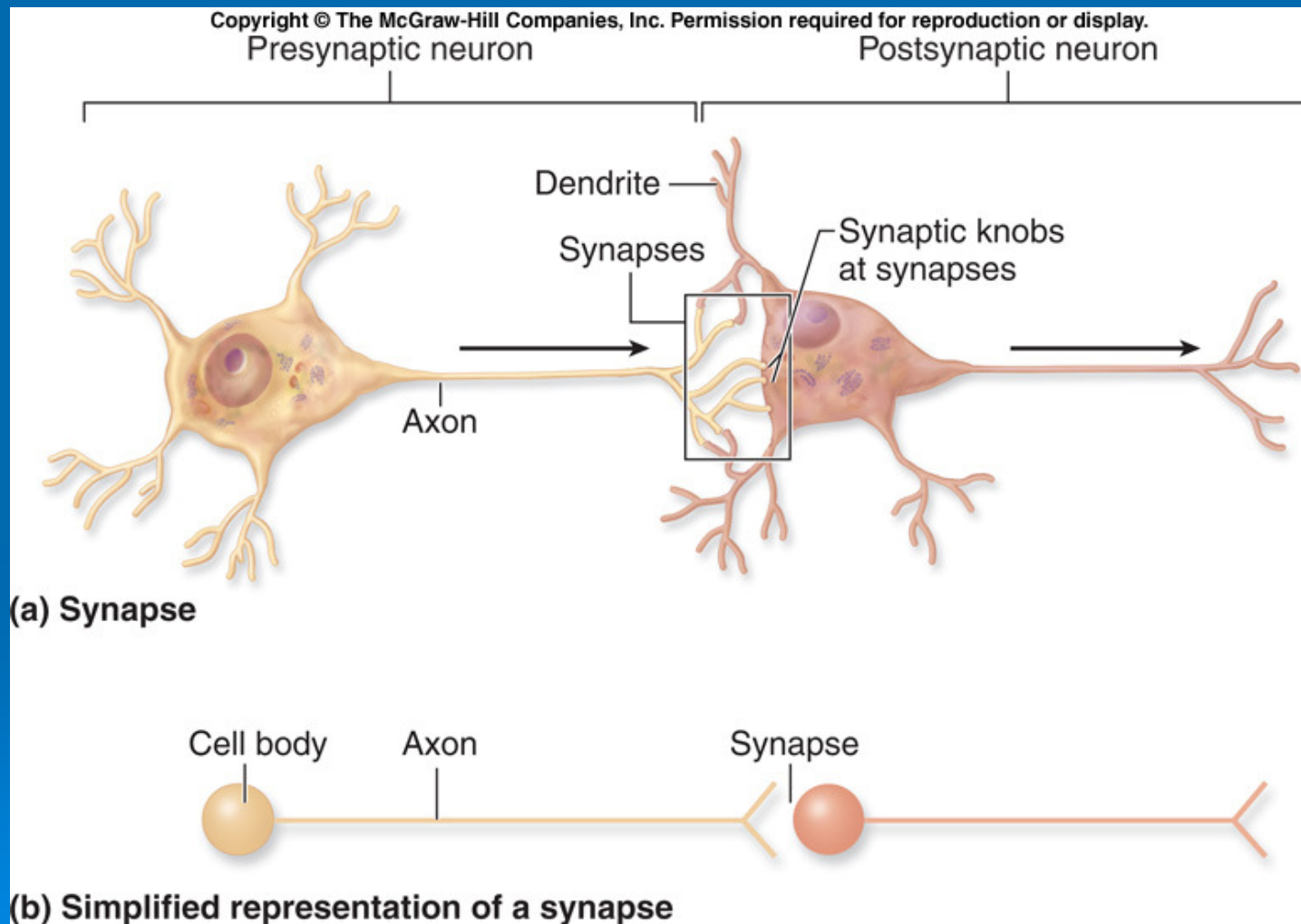


Images courtesy of Jay Giedd, MD, National Inst of Mental Health

What is happening during these years? – Brain “Molding”

- Life experience causes synapses to live and strengthen or wither and die
- This process “molds” the brain until the brain “sets” in its adult form
- This final brain structure then guides our thoughts and behavior in the future
- We now know that adolescent brains are exquisitely responsive to experiences they are having.

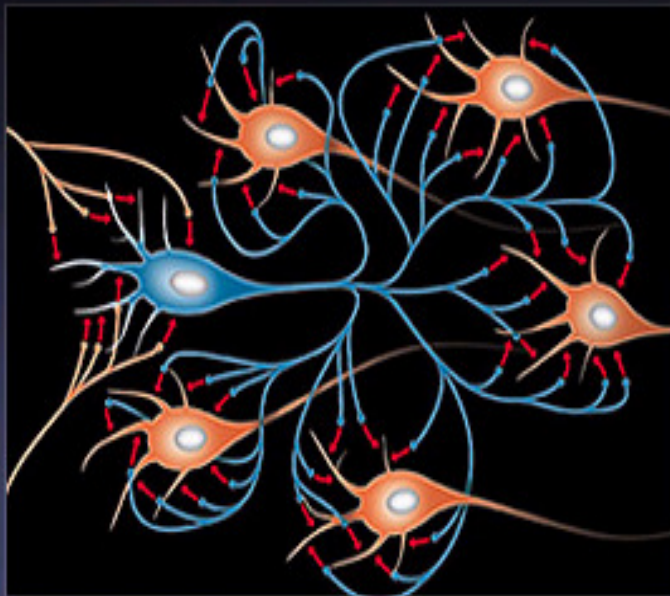
Synapses



Use It or Lose It Molds the Brain

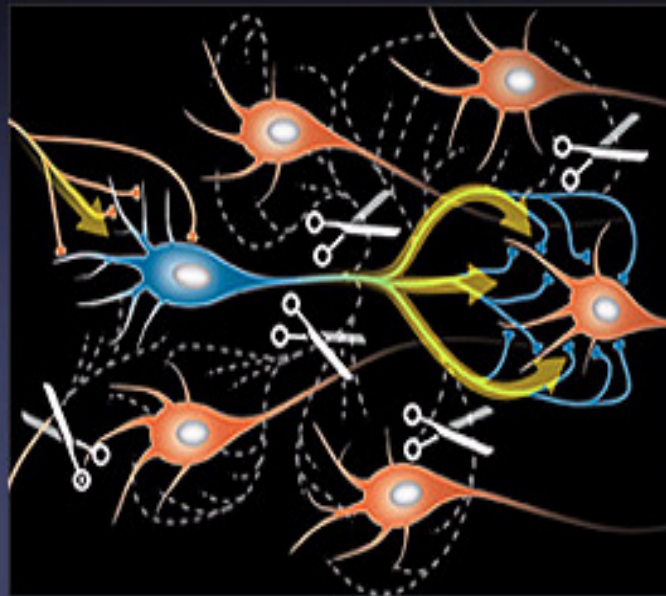
Nerve Proliferation...

- By age 11 for girls and 12 for boys, the neurons in the front of the brain have formed thousands of new connections. Over the next few years most of these links will be pruned.



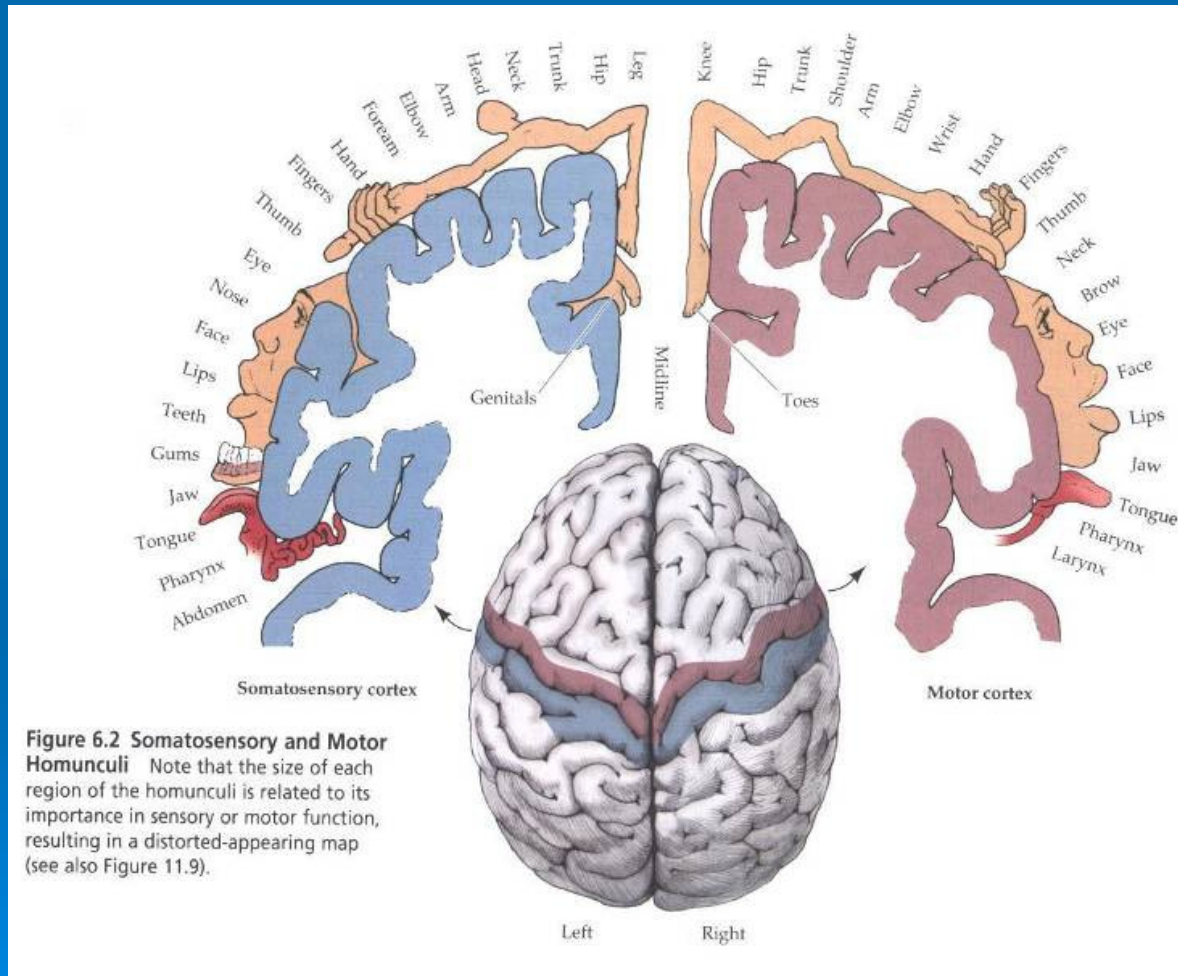
...and Pruning

- Those that are used and reinforced — the pathways involved in language, for example — will be strengthened, while the ones that aren't used will die out

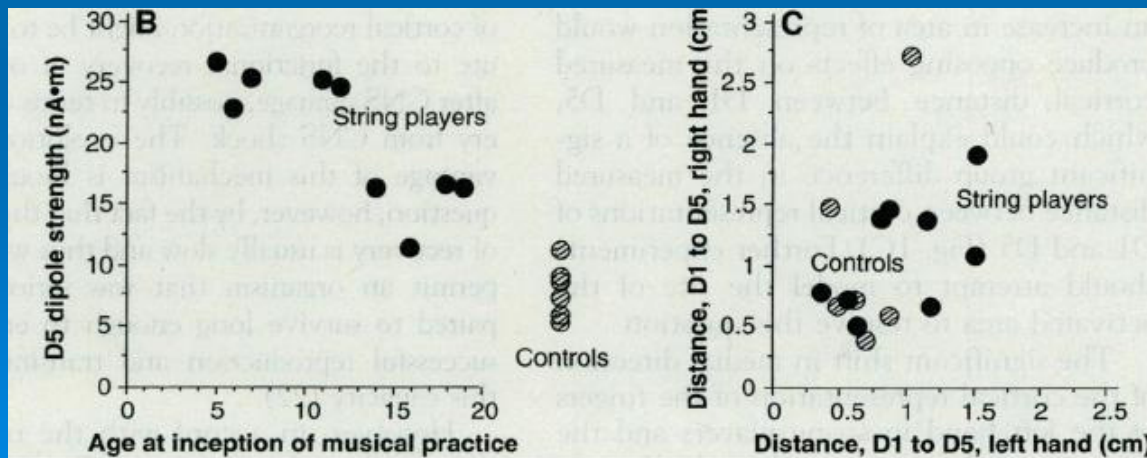
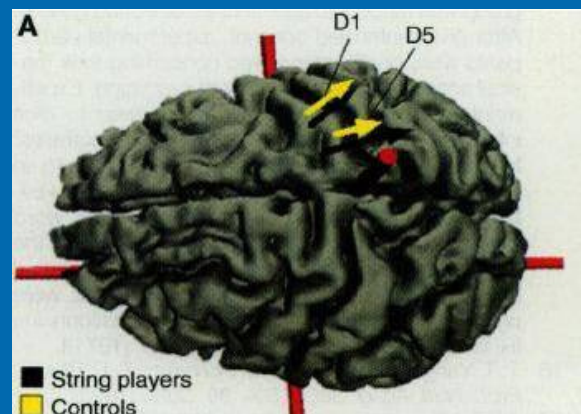


SOURCES: Dr. Jay Giedd, Chief of Brain Imaging, Child Psychiatric Branch—NIMH; Paul Thompson; Andrew Lee; Kiralee Hayashi; Arthur Toga—UCLA Lab of Neuro Imaging and Nitin Gogtay; Judy Rapoport—NIMH Child Psychiatry Branch. TIME Diagram by Joe Lertola. TIME.com graphic by Garrett Rosso. The Image Bank—Getty Images from the May 10, 2003 issue of TIME MAGAZINE

Homunculi



Increased Cortical Representation of the Fingers of the Left Hand in String Players



Brain Molding – Summary

The brain's final structure is formed as a result of experiences repeated over and over again.

The patterns of behavior become part of “who we are” and “what we do” because that is what our brain structure has become

We are generally unaware that our brain actually “make us do things” – either choices that are helpful or choices that are harmful

Love, Lust, Infatuation, Marriage –

All are powerful “Experiences” –

What does Modern Neuroscience tell us is going on in the Brain?



Can Modern Neuroscience Answer for Us

- Why do people who have sex usually continue to seek out sex – married or not?
- What enables a couple who have been married many years, sometimes after having intercourse to say “it is a miracle that we have been doing this so long and still enjoy it so much”



Dopamine is One Part of the Answer

➤ Dopamine is secreted into the brain in response to:

- excitement
- pleasure
- new things
- adventure
- risk taking
- addictive drugs

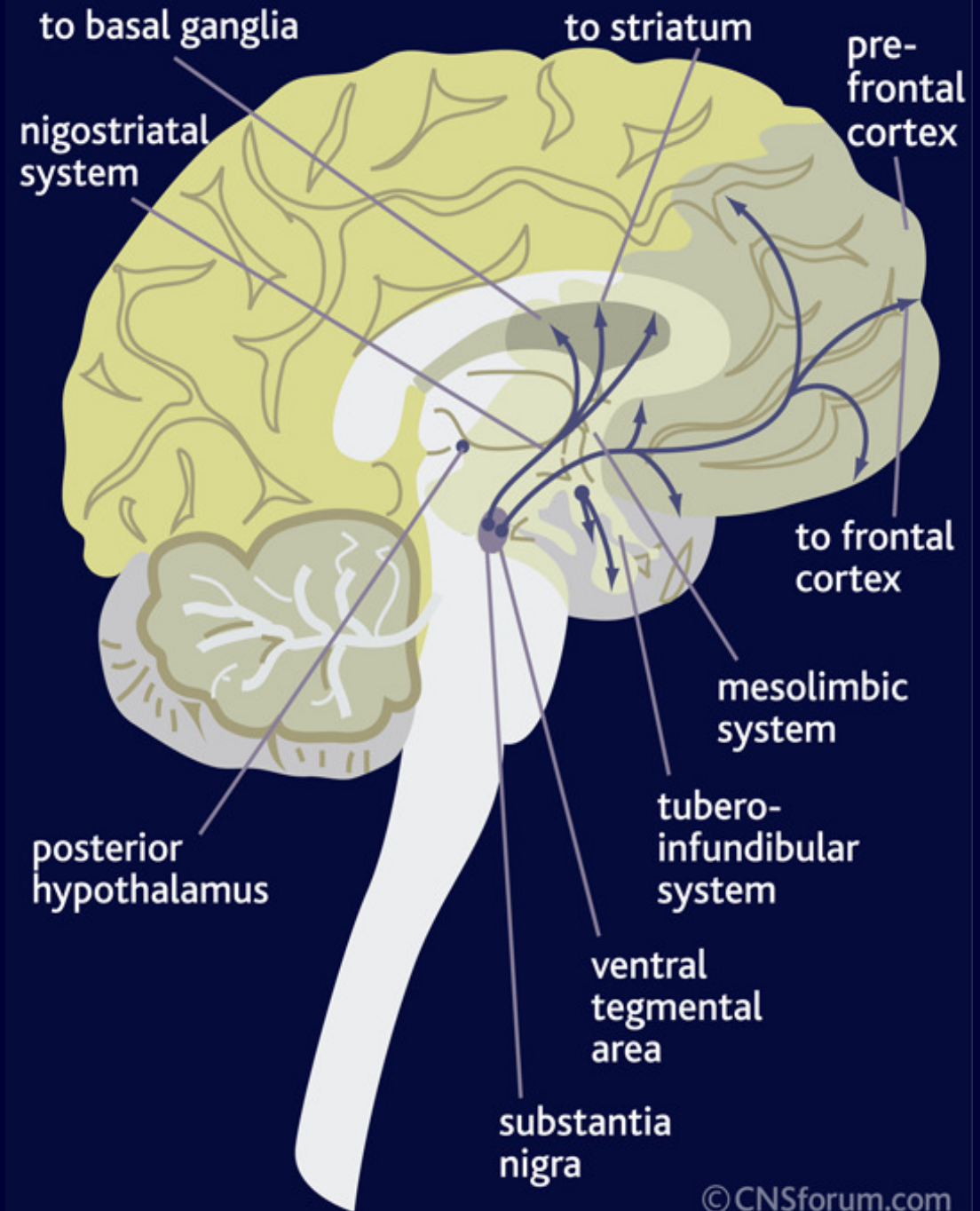
Dopamine (cont.)

- Dopamine causes a person to feel good by producing intense energy, exhilaration, and focused attention.
- Dopamine is involved in the feeling of need or desire to repeat pleasurable acts. Therefore, dopamine presence is termed a “reward signal.”
- We are biologically designed to enjoy new things. That is how we find new sources of food and new partners and find out where dangers are

Strauch. The Primal Teen, 2003.
Arias-Carrion, et al. Act Neurobiol Exp 2007

Dopamine Pathways within the Human Brain

- Mesolimbic system
- Tuberoinfundibular system



Dopamine and “Addiction”

- Addiction is defined by Dorland as “ the state of being given up to some habit, especially strong dependence on a drug”¹
- “Then there’s the addictive quality. For men and women alike, dopamine – the chemical that injects intense pleasure in activities as diverse as gambling and drug addictions rockets during sexual encounters.”²

1. Dorland. Medical Dictionary 27th Ed. 1988

2. Goleman. Social Intelligence

Can Modern Neuroscience Answer for Us

- Why do the risks of pregnancy, STD, abuse, and emotional damage not deter males and females from sexual involvement; in other words why do the words of Tammy Wynette's song "Stand By Your Man" ring so true?



Oxytocin is One Part of the Answer

- It is produced by the hypothalamus and stored in the pituitary gland. It is released by the pituitary
 - during labor
 - during suckling
 - during orgasm
 - during touching between individuals

Oxytocin Impact on the Body and Brain

- During labor – causes uterine contractions
- During suckling – causes milk letdown
- During physical contact – produces emotional bonding



Oxytocin and Bonding

- Oxytocin is released into a woman's brain when she is touched in a warm, meaningful and intimate way
- Oxytocin release into her brain —
 - increases her desire for more touch from the other person
- Two results (among others) —
 - powerful bonding between mother and baby¹
 - emotional bonding with and a strong desire for more intimate contact with the man she is physically touching

1. Uvuas-Moberg. Psychoneuro-endocrinology, 1998.

Men and Vasopressin

- The male brain has many more receptors for vasopressin. The female brain has many more receptors for oxytocin¹
- Sexual intercourse releases large amounts of vasopressin into the male brain¹
- Vasopressin in the male brain promotes bonding with a sexual partner¹
- “When men in love experience the effects of vasopressin, they have a laser like focus on their beloved and actively track her in their minds’ eyes, even when she isn’t present” ²

1. Lechman. Child Adolescent Psychiatry elin N Am, 1999

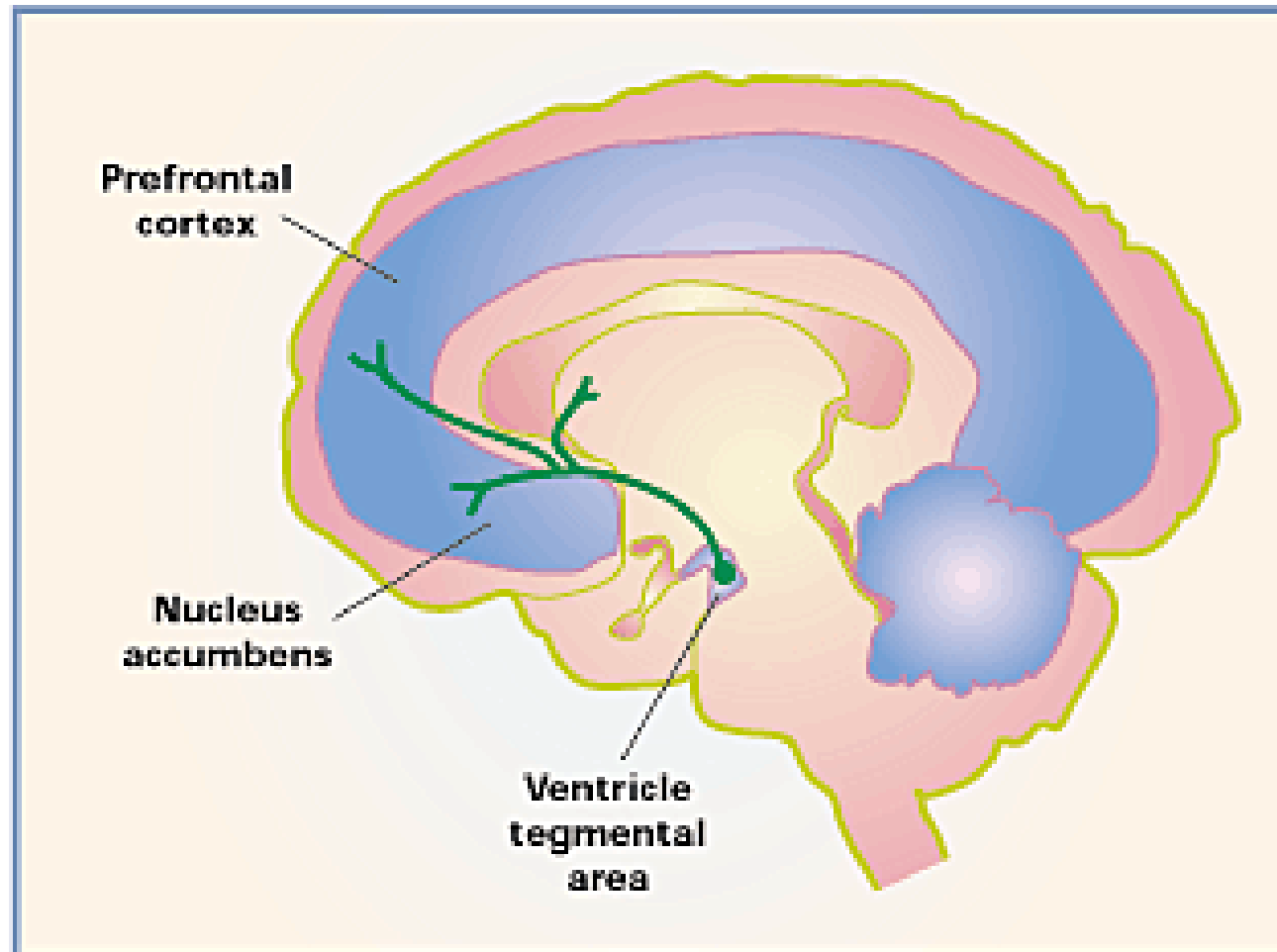
2. Brizendine. “The Female Brain” 2007

Oxytocin and Vasopressin — Their Vital Role

- Oxytocin in females and the male hypothalamic hormone, vasopressin, are both released during intimate male-female contact, resulting in pair-bonding.¹
- “The very process of spending time together, touching each other, having sex, and sleeping next to each other night after night, creates a powerful bond, partly biochemical, between partners.”²

1. Lim, M.M., Young, L.J. *Harm Behavior*, 2006
2. Morse, Jr. 2006

Brain Sites & Pathways Putatively Involved in Pair Bonding



Can Modern Neuroscience Answer for Us

- Why are some girls so strongly attracted to some guys?
- Is there chemical attraction that draws them unknowingly?



It's the Pheromones (well at least in part)

- Chemicals secreted from the skin and sweat glands of many animals and from human males and females¹
- These chemicals are unconsciously detected by the female nose (but not the male)¹
- These chemicals can influence a woman's attraction to a man and her sexual satisfaction with him²

It's Also Oxytocin — which Engenders Trust

- The “trust” impact of oxytocin is so pronounced that Louann Brizendine, M.D., a neuropsychiatrist at the University of California states “from an experiment on hugging, we also know that oxytocin is naturally released in the brain after a 20 second hug from a partner — sealing the bond between the huggers and triggering the brains trust circuits, so don’t let a guy hug you unless you plan to trust him.”

It's Also Serotonin — As Excitement Increases, It Decreases

- Serotonin, among other actions a calming neurohormone, has been shown to decrease in people madly in love, to levels similar to those found in individuals with obsessive-compulsive disorder.
- Therefore, people newly in love are less calm and may act somewhat obsessive-compulsive.

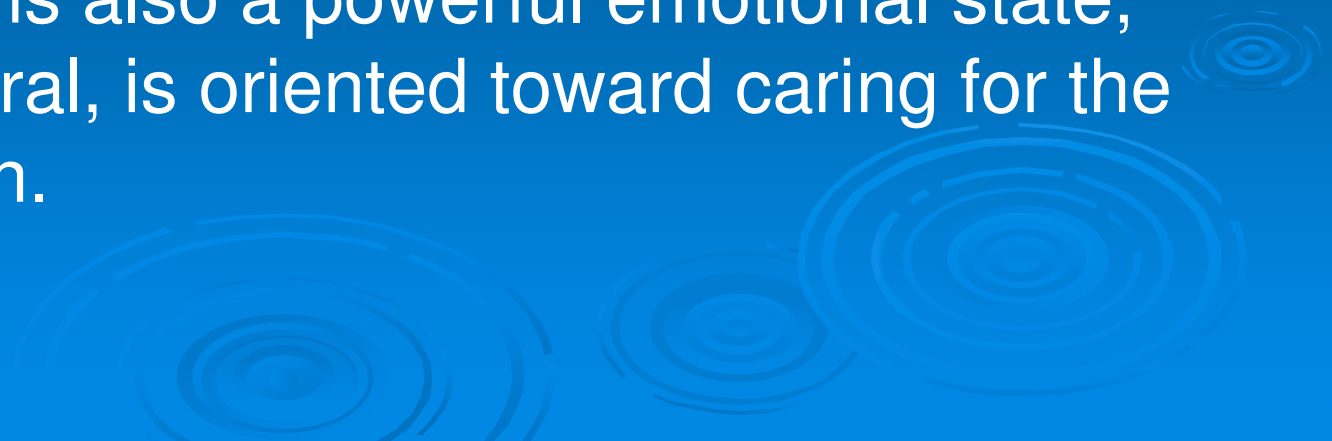
Lust, Infatuation and Mature Love

- Each of these result in dynamic and visible brain activity
- Each of these produce activity in different areas of the brain

Strauch. "The Primal Teen", 2003

Leckman. Child Adolesc Psychiatry. elin N Am. 1999

Lust, Infatuation and Mature Love (cont.)

- One individual cannot tell if another person's interest is a result of lust or love – only time and other behaviors can reveal the difference
 - Lust is a powerful emotional state and can cause people to do things that they would not ordinarily do, often for self-gratification.
 - “Early love” is also a powerful emotional state, but, in general, is oriented toward caring for the other person.
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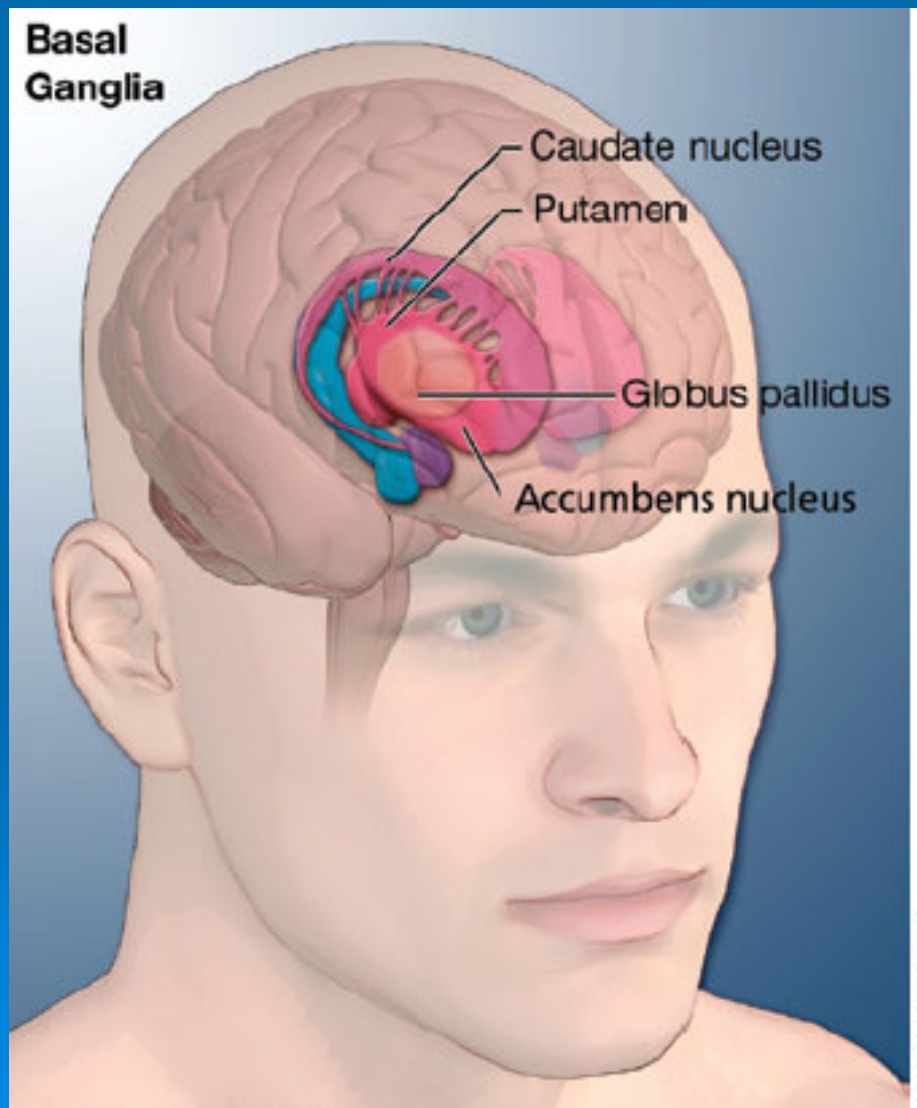
Lust, Infatuation and Mature Love (cont.)

- Mature love is the deep, abiding love of a couple that stays together and allows the healthy evolution of “early love”
- It is the stability of this mature love on which marriage, home and family depend

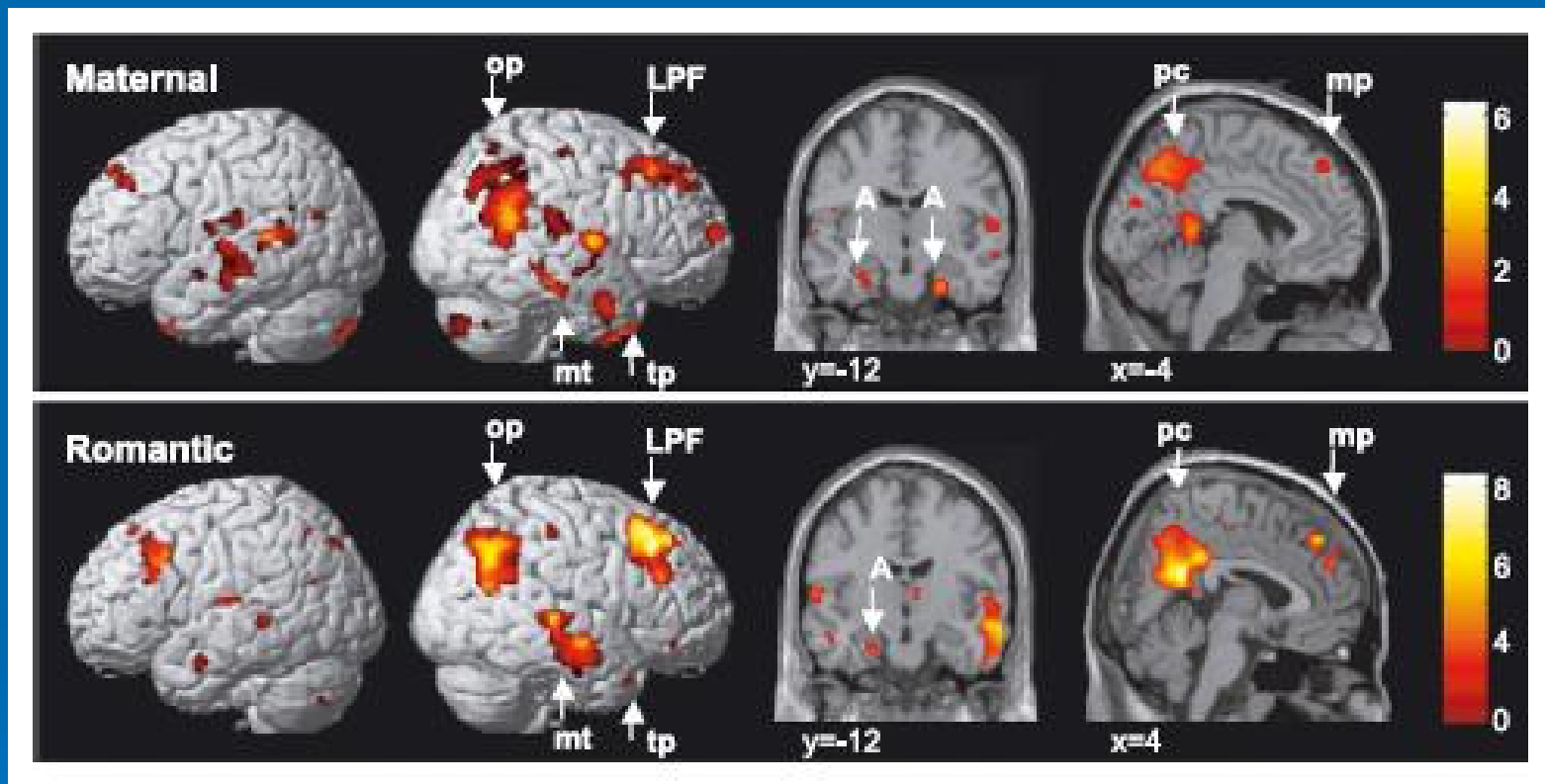
Brain Sites Activated by Lust

- Orbitofrontal cortex
- Medial prefrontal cortex
- Sensorimotor and pre-motor regions
- Anterior temporal pole
- Occipital & temporal gyri
- Insula
- Sub-insular regions
- Caudate putamen
- Amygdala
- Hypothalamus

Sites Activated by Mature Love

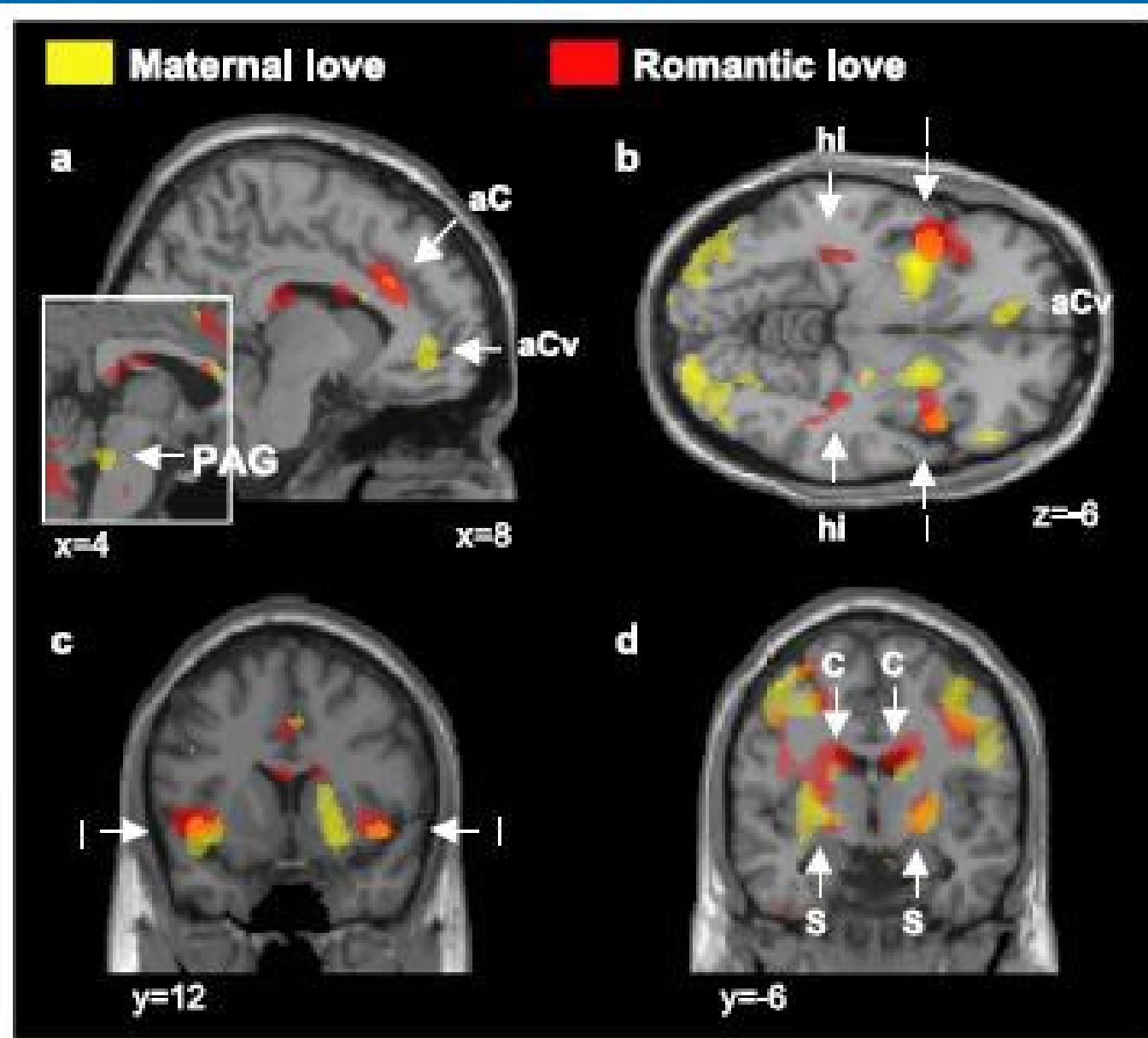


Sites Activated by Romantic Love



op – occipitoparietal junction
LPF – Lateral prefrontal cortex
mt – Middle temporal cortex
tp – Temporal pole

pc – Posterior cingulate cortex
mp – Medial prefrontal
paracingulate cortex



Sex, Therefore, Is a Powerful Brain Experience —

Two Powerful Brain Events Seem to Always Occur as a Result

- Attachment (“bonding”) to the sexual partner
- Desire for repetition of sex acts (“addiction”)



One Fundamental Understanding of Sexual Involvement —

It Is Human Connectedness and Human Connectedness is Essential to Normal Human Existence

- “Science is increasingly demonstrating that the human person is hardwired to connect”¹
- “A great deal of evidence shows that we are hardwired for close attachments to other people, beginning with our mothers, fathers and extended family, then moving out to the broader community”¹
- If babies are left in their cribs untouched they often fail to thrive and can even die²

1. Commission on Children at Risk, “Hardwired to Connect”, 2003

2. Johnson, et. Al. Trauma, Violence, Abuse, 2006.

Connectedness and Sex (cont'd)

- A new understanding for current neuroscience is that sexual involvement always results in connectedness between two individuals – as shown for example by sexual “addiction” and “bonding”



Connectedness and Sex (cont.)

- Humans are not composed of disconnected body parts:
 - eyes just made for visual images
 - hands just made for holding tools
 - feet just made for locomotion
 - genitals just made to connect with other genitals
- Humans are composed of interconnected body parts – functioning together and each part affecting the other

Connectedness and Sex (cont.)

- When a person's body is in intimate contact with another person, the entire person is “connected” with the other^{1,2}
- A person's inborn need for and ability to connect with another person is a human characteristic that must be nurtured and protected for a person to prosper^{1,2}
- Sexual connection can greatly benefit this gift we have been given or can greatly damage it

1. Light. Biol Psychol, 2005

2. Schore. “Affect Dysregulation and Disorders of the Self”, 2003

Sexual Involvement – Two Roads

“Two roads diverged in a wood, and I -- I took the one less traveled by, and that has made all the difference.”

-“The Road Not Taken” by Robert Frost

- The “road” of sexual behavior individuals take can “make all the difference”
- Non-marital sex – often leads to damaged connectedness, more relationship problems, more emotional problems and compromised opportunities for health, hope and happiness
- Marital sex – often leads to healthy connectedness, fewer relationship problems, fewer emotional problems and enhanced opportunities for health, hope and happiness

Non-marital Sex

- Bonding always occurs with sexual involvement as far as science can tell¹
- The cycle of sexual involvement – break up- sexual involvement – break up is usually the pattern unmarried sexually involved individuals experience²
- Societal factors, alcohol and drug use with sex, immaturity and other factors seem to be some of the reasons bonding does not keep most of these people together²

1. Lim, et.al. Horm Behav 2006
2. Independent Women's Forum Survey, 2001

Broken Bonding may Explain Adolescent Depression

- According to a national survey on teen health those who were sexually active were 3 times more likely to be depressed than those who were abstinent^{1,2}
- Suicide is attempted more often by sexually active teens than those who have not had sex; 3 times more often by girls and 8 times more often by boys^{1,2}

1. Hallfors DD. *Am J Prev Med* 2005

2. Rector RE, et al. *The Heritage Foundation* 2005

Broken Bonding, Repetitively Experienced, Seems to Often Damage the Human Ability to “Bond” (to Connect)

- Individuals who have had multiple sexual partners prior to marriage are more likely to divorce when they do marry than individuals who did not have multiple partners prior to marriage¹
- Couples who cohabit before marriage are more likely to divorce when they do marry than couples who did not cohabit ²

1. Kahnetal. J of Marriage and Fam, 1991

2. Lee, et al. Demography, 1995

Unhealthy Brain Molding

- Evidence seems to show that the more sex partners we have, the more our innate attachment ability seems to be threatened¹
- Brain molding that results in incomplete or unhealthy attachments is a threat to one's emotional and physical health
- The philosophy that teaches that the sex act can be separated from our emotions, our minds and the rest of what we are as humans is a dangerous threat to our young people²

1. Hahn, et. al. J of Fam Med, 1991

2. SIECUS. Sexuality Education Guidelines, 2004

Effect of Sex Trauma on Bonding

- Traumatic intimidation such as abuse, rape and sexual coercion leads to high levels of stress that can cause the release of excessive levels of BDNF (brain-derived neurotrophic factor).
- Genes in the frontal lobes of the brain are turned on which may result in social withdrawal, depression, fearful behavior to any threat, a tendency to addictive behaviors, and an inability to enjoy intimacy in the future.

Married Sex

Long Term Relationships (A Characteristic of “Bonding”

It is rare in America for a spouse in an intact marriage to have sex with anyone but their own spouse

Desire for Pleasure (A Characteristic of “Addiction”)

“The group that has the most sex is not the young and the footloose but the married”

“Married women had much higher rates of ‘usually’ or ‘always’ having orgasms as compared to women who were never married and not cohabitating”

Marriage and The Impact of Sexual “Addiction” and Bonding

When two people commit to each other and marry:

- The dopamine reward of sexual intercourse keep them addicted to repeating that behavior – often resulting in procreation
- Oxytocin and vasopressin facilitates the bonding that keeps them together year after year providing the most healthy “nest” for raising the offspring that often result.

Humans and Lifelong Sexual Monogamy

- Most human beings brains seem to be structured to best experience sex in an exclusive lifelong mutually faithful and monogamous relationship



Humans and Lifelong Sexual Monogamy (cont)

➤ This is shown by the following

- most young people desire marriage¹
- most young people believe sexual abstinence is the best behavior²
- the happiest, most faithful, most rewarding sexual experiences are in faithful marriages³
- the further individuals deviate from this pattern the more problems and regret they experience
(see following examples)

1. Independent women's Forum. College Survey, 2001
2. National Campaign to Prevent Pregnancy Survey, 2005
3. Laumann, et. al. Sex in America, 1995

No Commitment to Monogamy

➤ Multiple Partners

- the risk of STI/STD infection is directly related to the number of lifetime sexual partners¹
- one in four sexually active adolescents is infected with an STI²

➤ Nonmarital Pregnancy

- one third of American babies are born out of wedlock²

➤ Emotional risks – depression and suicide ideation

➤ Increased risk of marital problems and divorce³

1. Ickovics, et. al. Sex Trans Infect, 2003
2. Martin, et. al. Natl. Vital Stat Rep, 2003
3. Hahn, et. al. J of Marriage and Fam, 1995

Compromised Monogamy - Cohabitation

- Less likely than marrieds to view their sexual union as permanently exclusive¹
- People who cohabit did not know their partners as long before they had sex as did couples who married²

1. Write and Gallagher. The Case For Marriage. 2000
2. Laumann, et. al. Sex in America, 1995

Compromised Monogamy – Cohabitation (cont)

- Women who are cohabitating are more likely to have been forced to do something sexually they did not want by a man²
- Cohabitors are much more violent than marrieds³
- Compared to married couples, cohabiting couples have less healthy relationships³

2. Laumann, et. al. Sex in America, 1995

3. Hahn, et. al. J Marriage and Fam, 1991

What Can We Do

- Understand that there is a problem
- Understand that the problem particularly affects young women but can significantly affect young men too
- Understand that they do want our help
- Understand the incredible importance of dopamine for an adolescent and help young people “feed” on it
- Understand that adults can help young people have the best chance of achieving their potential
 - see following examples -

There Is a Problem

Dopamine “Addiction” Seems to Be Working Well

- 1/4 of college students have had sexual intercourse with six or more partners in their lifetime¹
- 47% of college students have had oral sex in the past 30 days²

1. CDC, YRBS: National College Health Risk Behavior Survey, 1995.
2. National College Health Assessment: Reference Group Executive Summary.2005
3. National Institute of Justice. 2000.

There Is a Problem

Dopamine “Addiction” Seems to Be Working Well

- More than 2/3 of college students had had sexual intercourse during the three months preceding the National College Health Risk Behavior Survey¹
- The annual sexual victimization rate (completed and attempted rapes) is 35.3 per 1000 female students (eq. 350 annually on a campus of 10,000) ³

1. CDC, YRBS: National College Health Risk Behavior Survey, 1995.
2. National College Health Assessment: Reference Group Executive Summary.2005
3. National Institute of Justice. 2000.

Young Women are More Vulnerable and Therefore Need our Protection and Guidance

- They are much more likely to be pressured for sex¹
- Their behavior decisions can be influenced unconsciously -
 - for example by pheromones
 - sensitive to as little as one-hundredth of a drop
 - influences desire for sex
 - cause mood to brighten and mental focus to sharpen, increasing propensity to sexual behavior²

1. Kaiser Family Foundation Survey, 2002

2. Haulicek, et. al. Biol Lett 2005

Young Women Are More Vulnerable (cont)

- Oxytocin not only makes them “bond” it can also make them “trust”¹
- More women than men say their beloved’s faults don’t matter much to them and women score higher on the test of passionate love ²

1. Brizendine. “The Female Brain” , 2006

2. Fisher, 2005

Young People are Crying Out for Help

- 90% of high school students think they all need a strong abstinence message from all society
- 2/3 of high school students think it is wrong for high schoolers to have sex even if they use condoms and contraceptives

Young People are Crying Out for Help (cont)

- 2/3 of students who have had sex wish they had waited
- Since 2/3 of high school students have had sexual intercourse by graduation, we know many of these students were sexually active

The Adolescent Brain is Intensely Interested in New Things

It is being flooded with surges of neurochemicals and hormones that cause an adolescent to see the world with intense new interests and in an entirely new light.



Dopamine – A Necessity for Normal Adolescent Development

Dopamine is important for “lighting the fire” in adolescent brains to:

- desire to win awards
- enjoy learning
- focus on their environment
- make choices when the goal is not obvious
- control impulses
- develop mature judgment

Dopamine and Adolescent Development


Dopamine motivates the adolescent to take the risks necessary for the pursuit of independence:

- to take the risk of separating from parents into maturity
- to take the risk of finding out who one is and where one fits in, including finding an occupation
- to take the risk of love and marriage

The “Dopamine High”

- “We as a society are doing a remarkably poor job at addressing our adolescents partly hardwired needs for risk, novelty, excitement and peer affiliation”¹
- We adults can help provide that as we encourage achievement in academics, sports, spiritual growth, adventures and relationship building
- We can encourage the older young person to experience the thrill of gradually becoming independent and self sufficient


Humans are Not Robots

- Human cognition and behavior is very complex
 - Humans are more than the sum total of their anatomy – including more than brain structure and chemicals
 - Humans have the capacity to make decisions and experience healing that cannot be explained by these physical things
 - Yet we would be remiss to ignore what science has shown us
- 

Adult Neglect – Great Cost

Adult Involvement – Great Rewards

Adolescents are unaware of the powerful inner forces they can arouse if they become involved in sexual activity. These inner forces can control their behavior just as surely as drug addiction can. Guidance away from this “real and present danger” can and must come from us adults, particularly parents, who care for and love our children



Adults and Adolescents (cont)

- The interests and then the experiences that adolescents have can be guided by exposures that are uncontrolled, premature and unhealthy, both physically and emotionally, producing young adults with unhealthy brain development and with physical and emotional baggage that can take years to overcome – if ever.




Adults and Adolescents (cont)

- The interests and then the experiences that adolescents have can be guided by parents, caring adults and, hopefully, an evermore healthy society, to produce young adults with healthy brain development and who, therefore, can maximize their potential.



Adults and Adolescents (cont)

- The brain learns by trial and error, particularly from the age of 18 on
 - Mistakes are supposed to be made by adolescents
 - The role of parents is to provide boundaries within which a young person can make decisions including mistakes, as safely as possible.
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Parental Guidance is the Key

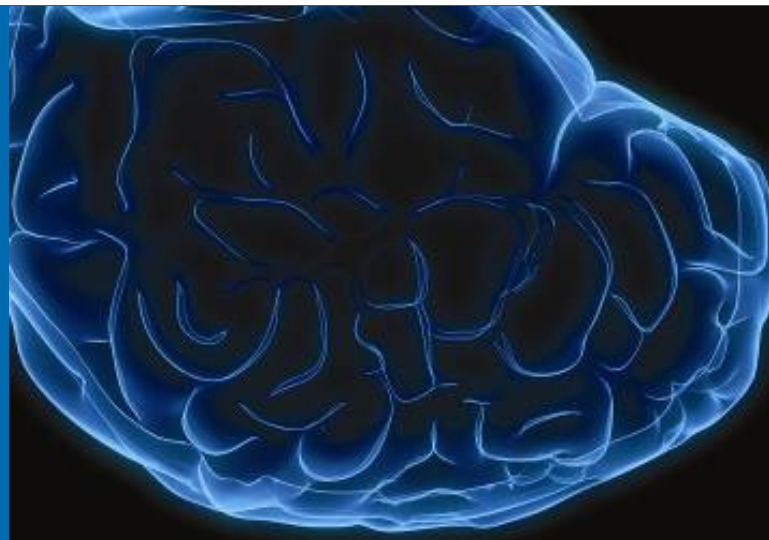


- Parents, physicians (mentors and other caring adults) can fill in the part of adolescents' brains that are not yet formed and can help them follow the "best road"
- Caring, loving and authoritative counsel and guidance –can help young people make good decisions

Achieving Their Dreams

- With adult help, young people can trump the negative messages of peers, media and society
- As young people learn to make good decisions with help, this healthy pattern becomes a part of their brain structure
- As adults they will then more likely continue to make wise, thoughtful, healthy decisions
- They will then have a greater chance of achieving their dreams





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H O O K E D

NEW SCIENCE ON HOW CASUAL SEX IS
AFFECTING OUR CHILDREN

