I have nothing to disclose.

- Brain Development
- Teen Developmental Stages
- #1 Cause of Teen Death
- Current Trends seen in the Media
The German chainsaw massacre: Teenager is injured after his friends almost cut off his hand with powerful weapon while trying to copy viral video they saw online

- The teenagers were inspired by a viral video when a man woke up his friend
- The video shows the man starting a chainsaw and lunging it at his friend's throat
- A German teenager was injured after one friend decided to recreate the video

By ISOBEL FRODSHAM FOR MAILONLINE
PUBLISHED: 04:11 EST, 28 December 2016 | UPDATED: 05:50 EST, 29 December 2016

15-year-old Washington schoolboy lit a firework he was holding in his hand
Why do they do that?
<table>
<thead>
<tr>
<th>Rank</th>
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<th>Total</th>
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<td>10</td>
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• 1904—Psychologist Granville Stanley recognizes adolescence as a unique developmental state.
• 1940’s “teenager” first used, post WW2—cultural phenomenon: James Dean, teenyboppers, etc.
Brain maturation continues until ~mid-twenties

The adolescent brain is a “work in progress”

Synaptic plasticity—can learn faster, absorb more information

Adolescents are more susceptible to external stimuli or insults, which offers advantages but also vulnerabilities
MRI studies

- Gray matter-mostly neurons and synapses
- Peak in early childhood, declines until puberty, increases, then consistent decline in adulthood
• Brain develops and matures from back to front. Connections continue to be made until mid-20’s

• Frontal lobe, prefrontal cortex last to develop
  – Executive function
Executive Function

- Judgment
- Insight
- Planning
- Impulse control
- Self-awareness
- Ability to assess dangers and risk
- Limited understanding of consequences, ability to make mature decisions
• Limbic system also later to develop
  – Hypothalamus, hippocampus, amygdala
  – Complex system of nerves and networks in the brain, instinct and mood
  – Reward seeking
  – Memories and emotions
  – Decision making can be overly influenced by emotions

Limbic System online sooner than Frontal Cortex (Accelerator before brakes!)
• Dopamine—feelings of pleasure
  – The “gotta have it” hormone—addictive behaviors
  – MRI studies suggest teens need more excitement and stimulation to receive the same level of pleasure as an adult.
Welcome to being a parent of a teenager. Prepare for a large amount of eye rolling, emotional outbursts, and thoughts of running away. And that's just the parents.
Adolescent Development
The way they are acting is…

NORMAL

(Despite how completely abnormal it seems)
Adolescent Development
Intellectual/Cognition

Early Adolescence (10-14 years)
• Very concrete—"here and now"
• Cause-effect relationship underdeveloped

Middle Adolescence (15-17 years)
• Growth in abstract thought, however reverts to concrete thought when stressed
• Cause-effect relationships better understood
• Very self-absorbed

Late Adolescence (18-21 years)
• Abstract thought established
• Future oriented; able to understand, plan and pursue long-term goals
• Philosophical and idealistic
Early Adolescence (10-14 years)
- Challenges authority, family; anti-parent
- Loneliness
- Wide mood swings
- Things of childhood are rejected
- Argumentative and disobedient

Middle Adolescence (15-17 years)
- Conflict with family predominates due to ambivalence about emerging independence

Late Adolescence (18-21 years)
- Emancipation-adult lifestyle

Public.health.oregon.gov/HealthyPeopleFamilies/Youth/AdolescentGrowthDevelopment/Documents/adoldevstages.pdf
Early Adolescence (10-14 years)
• Preoccupation with physical changes and critical of appearance
• Peers used as a standard for normal appearance
• Anxiety over secondary sexual characteristic changes

Middle Adolescence (15-17 years)
• Less concern about physical changes but increased interest in personal attractiveness

Late Adolescence (18-21 years)
• Usually comfortable with body image
Adolescent Development

Peer Group

Early Adolescence (10-14 years)
• Serves a developmental purpose
• Intense friendships with same sex
• Contact with opposite sex in groups

Middle Adolescence (15-17 years)
• Strong peer allegiances, fad behaviors
• Sexual drives emerge and teens begin to explore ability to date and attract a partner

Late Adolescence (18-21 years)
• Decisions/values less influenced by peers
• Relates to individuals more than to peer group
• Selection of partner based on individual preference

Public.health.oregon.gov/HealthyPeopleFamilies/Youth/AdolescentGrowthDevelopment/Documents/adoldevstages.pdf
Adolescent Development

Identity Development

Early Adolescence (10-14 years)
- “Am I normal?”
- Daydreaming
- Begin to develop own value system
- Desire for privacy
- Magnify own problems: “no one understands”

Middle Adolescence (15-17 years)
- Experimentation, risk-taking behavior

Late Adolescence (18-21 years)
- Relate to family as an adult
- Realizations of own limitations and mortality
- More capable of intimate, complex relationships
Risk Factors: Why do teens seek risk?

• Individual
  – Low self-esteem
  – Negative peer groups
  – Low school engagement or academic aspirations

• Familial
  – Poor parent-child communication
  – Low parental monitoring
  – Lack of parental support
High Risk Behaviors in Adolescence

- Substance Use
- High-risk sexual behaviors
- Driving-related risks
- Accidental Injury
- Self-Injury, Suicide
- Violence
Percentage of High School Students Who Ever Had at Least One Drink of Alcohol,* 1991-2013†

*On at least 1 day during their life.
†Decreased 1991-2013, no change 1991-1999, decreased 1999-2013 [Based on linear and quadratic trend analyses using logistic regression models controlling for sex, race/ethnicity, and grade (p < 0.05). Significant linear trends (if present) across all available years are described first followed by linear changes in each segment of significant quadratic trends (if present).]

National Youth Risk Behavior Surveys, 1991-2013
Percentage of High School Students Who Currently Drank Alcohol, * 1991-2013†

*At least one drink of alcohol on at least 1 day during the 30 days before the survey.

†Decreased 1991-2013, no change 1991-1999, decreased 1999-2013 [Based on linear and quadratic trend analyses using logistic regression models controlling for sex, race/ethnicity, and grade (p < 0.05). Significant linear trends (if present) across all available years are described first followed by linear changes in each segment of significant quadratic trends (if present).]

National Youth Risk Behavior Surveys, 1991-2013
• Adolescent brain responds to alcohol differently than the adult brain
• Adolescents are more sensitive than adults to alcohol’s memory-impairing effects
• Alcohol exposure (esp binge drinking) during adolescence affects brain function during adulthood

(National Institute on Alcohol Abuse and Alcoholism)
For many adolescents (45-66%), substance use disorders precede the onset of trauma exposure.

There is a direct link between alcohol use and engaging in risky behaviors in which adolescents may get hurt.

National Child Traumatic Stress Network, 2008
• Teens with substance abuse disorders are significantly more likely than their non-substance abusing peers to experience traumas that result from risky behaviors.

National Child Traumatic Stress Network, 2008
Case Study #1

- 15 yo male
- Found outside airport, unk length of time.
- Feels “cold to touch”
- Bruising to back with pain
Case Study #1

- Witnessed jump/fall off Metro platform (approx. 30 feet)
- Per EMS, pt unresponsive, then awake, “slurring words.” Told police he drank approx 20 beers earlier.
• Scene EMS
  – 18g IV and 16g IV placed
  – 500 ml NS bolus given
  – C-Collar
  – Backboard
• Arrives to SLCH at 0639 via EMS
• Initial vitals:
  – P 118, R 34, BP 94/38, SPO2 95% on NRB
  – Pain-10/10, GCS: 14 (4/4/6), Temp: 35.7
• Primary & Secondary Assessment:
  – Decreased breath sounds on the right. Right chest wall tenderness
  – Skin cool, mottled
  – Pelvis tender to palpation
  – Abrasions and contusions noted to left arm and back
• Bair Hugger Applied
• CXR done
  – Right pneumothorax
  – Chest tube placed at 0654, initially 150ml bloody output, followed by 450ml
• 0655-1 Liter NS, 0658-1 Liter NS via rapid infuser, 0732-1 unit PRBC
• Pt given midazolam and fentanyl
• 0710-To CT for Head, Chest, Abd/Pel
• Parents arrive, in CT, updated by ED attending
• BP dropping while in CT
• 0730-MTP initiated by ED attending
• 0750 to PICU from CT
INJURIES

- Right lung hemo-pneumothorax
- Right lung contusion
- Multiple right-sided rib fractures (ribs 1-12)
- Left clavicle fracture
- Pelvic fractures
- Grade 2 Liver laceration
- Right elbow fracture
- T 6-8 transverse process fractures
• PICU x2 days
• Ancef, CADD, bacitracin to abrasions, ortho, neurosurgery, pain service consults, OR for elbow fx.
• Floor x 11 days
• Chest tube remained in for 10 days
• Psychology eval and follow up
• Family hx of addiction to narcotics
• Pt hx of use as well—vicodin, ecstasy, marijuana, had stopped approx 2 months before injury
• ETOH-98 mg/dl (nml 0-10 mg/dl)
• Pt hx of experimenting with drugs and alcohol, parents had been drug testing him. He reports a desire to stop using drugs.
• Hx of ER for alcohol poisoning
• Recent positive changes
• Had taken metrolink that night because he knew he shouldn’t drive with someone who had been drinking
• SW provided intervention and resources
SBIRT

- Screening,
- Brief
- Intervention and
- Referral to
- Treatment
“Trauma centers can use the teachable moment generated by the injury to implement an effective prevention strategy…it is vital that trauma centers have a mechanism to identify patients who are problem drinkers. Such mechanisms are essential in Level I and Level II trauma centers…”
Screening age 12 and above?

- Average age of initiating drinking:
  1965: 17 ½ years
  2003: 14 years
  2015: 13 years

- SAMHSA study 2011
  - 10.2% of patients admitted for substance abuse treatment first contact with substance use at age 11 or younger. 29.7% were age 12-14 (primary substance marijuana for younger ages, 15-17 first substance was alcohol)
• The likelihood of a child becoming alcohol dependent, being in a MVC due to alcohol consumption, and being in a physical altercation after drinking all increase in children who begin drinking before 15 years old.
• 2017-initiated new process for SBIRT at SLCH
• Bedside nurses will be completing the CRAFFT tool with their patients age 12 and older upon admission
• Riding in a **CAR** with someone under the influence
• Use drugs or alcohol to **RELAX**
• Use drugs or alcohol **ALONE**
• FORGETS things they did while using drugs or alcohol
• Have **FRIENDS** told you that you should cut back on drinking or drug use
• Gotten into **TROUBLE** while using alcohol or drugs

Two Yes answers = Positive CRAFFT
• **Motor Vehicle Crashes** are the leading cause of death among American teens.

• The risk of **Motor Vehicle Crashes** is higher among 16-19 year olds than among any other age group.

Leading Causes of Teen Crashes

- Driver inexperience
- Driving with teen passengers
- Nighttime driving
- Not using seatbelts

- Distracted driving
- Drowsy driving
- Reckless driving
- Impaired driving

http://www.cdc.gov/motorvehiclesafety/teen_drivers/teendrivers_factsheet.html
• Distracted Driving
  – Texting while driving
  – Snapchatting while driving
  – Internet use while driving
## Inattention Comparison at 60mph

<table>
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<tr>
<th>Time</th>
<th>Total Feet</th>
<th>Basketball courts</th>
<th>Soccer Fields</th>
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<td>176</td>
<td>1.9</td>
<td>0.59</td>
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</table>

Fear of Missing Out
TEENS’ “FEAR OF MISSING OUT” (FoMO) IS PROVING TO BE DANGEROUS.

TEENS’ “ALWAYS ON” LIFESTYLE MAY LEAD TO DROWSY AND DISTRACTED DRIVING

LACK OF SLEEP HURTING TEENS
- 52% get less than 6 hours of sleep per night during the week
- 56% have fallen asleep or nearly fallen asleep at the wheel
- 51% of parents attribute lack of sleep to looking at texts or app notifications

TOP REASONS TEENS ARE FALLING ASLEEP BEHIND THE WHEEL
- Busy Schedule: 43%
- Homework: 32%
- Social Activities: 24%
- Working Late: 20%

DROWSY DRIVING
- 100,000 crashes AND 1,550 fatalities occur annually as a result of driver fatigue*

TEENS CAN’T PUT THE PHONE DOWN
- 48% text MORE when alone in the car
- 48% of self-identified “safe drivers” still admit to using apps while driving
- 55% text while driving to update their parents
- 88% of self-identified “safe drivers” still admit to using apps while driving

TOP APPS THAT DISTRACT TEENS
- Snapchat: 38%
- Instagram: 20%
- Twitter: 17%
- Facebook: 12%

DISTRACTED DRIVING
- Nearly 3,000 fatal crashes annually are distracted drivers; 10% of those are teens*

For more information, visit www.libertymutual.com/teen driving

*Source: National Highway Traffic Safety Administration
Data from 2014 Liberty Mutual Insurance and SADD (Students Against Destructive Decisions) survey of 1632 teens and 1000 parents across the country
What can we do?
Self-Driving Cars

Why You Shouldn’t Be Allowed to Drive

Google’s Autonomous Cars Will Now Be Considered ‘Real’ Drivers

Google to Ask Congress to Help Put Self-Driving Cars on the Road
What can we do?

- Prevention!!!!
- Parent/Caregiver involvement
- Repetition-talk about things over and over and over!
  - Frontal lobe—prospective memory
Trauma Awareness Month

NEVER TEXT AND DRIVE.
PROTECT YOURSELF. PROTECT YOUR FAMILY.

Your family is important to our family! The Trauma Team at St. Louis Children’s Hospital is spreading the word about the dangers of distracted driving. To help remind you to not text and drive, we’re giving you two thumb bands with the message “It Can W8.”

Protect yourself and your passengers:
• Wear your thumb bands as a reminder to NEVER text or make a call while driving.
• Turn your cell phone OFF when in a vehicle.
• Put your cell phone in the trunk – no temptation to respond to a text!

DID YOU KNOW?
Each text takes a driver’s eyes off the road for an average of 4.6 seconds, the equivalent of driving the length of a football field at 55mph blindfolded.

Children’s
Hospital – St. Louis
Washington
University in St. Louis
Physicians
TRAUMA AWARENESS MONTH

DISTRACTED DRIVING

During May, the Trauma Team will be spreading the word about Distracted Driving by encouraging our staff, patients and families to take the pledge to never text and drive. It Can W8 thumb bands can serve as a reminder about the dangers of distracted driving.

Get involved!
• Visit us in the cafeteria on May 5, 6 and 8 to learn more about distracted driving and pick up a thumb band.
• Look for our “roving carts” on the floors. We’ll have more information along with chances for staff to register and win concert tickets, Cardinals tickets and more!

Join the fight to end texting and driving. It Can W8!
Questions? Contact Trauma Services at 314.454.2082.

The General Surgery Team says, “It Can W8!”
Parent-Teen Driving Agreement
PARENT-TEEN DRIVING AGREEMENT

I PROMISE.

I promise that I will obey all the rules of the road.
☐ Always wear a seat belt and make sure my passengers buckle up.
☐ Obey all traffic lights, stop signs, other street signs, and road markings.
☐ Stay within the speed limit and obey posted speed limits.
☐ Never use the car to race to or to try to impress others.
☐ Never give rides to hitchhikers.

I promise that I will make sure I can stay focused on driving.
☐ Never text while driving (writing, reading, or sending messages).
☐ Never talk on the cell phone — including handsfree devices or speakerphones — while driving.
☐ Drive with both hands on the wheel.
☐ Never eat or drink while driving.
☐ Drive only when I am alert and in control.
☐ Call my parents for a ride home if I am impaired in any way that interferes with my driving ability.
☐ Never use headphones or music to listen to music while I drive.

I promise that I will respect laws about drugs and alcohol.
☐ Drive only when I am sober and drug free.
☐ Never allow any alcoholic or illegal drugs in the car.
☐ Be a passenger with drivers who are sober and drug free.

I promise that I will be a responsible driver.
☐ Drive only when I have permission to use the car and I will not let anyone else drive the car unless I have permission.
☐ Drive someone else’s car only if I have parental permission.
☐ Pay for all traffic citations or parking tickets.
☐ Complete my family responsibilities and maintain good grades at school as listed here: _____________________________________________________________________________
☐ Contribute to the costs of gasoline, maintenance, and insurance as listed here: _____________________________________________________________________________

I agree to follow all the rules and restrictions in this agreement. I understand that my parents will impose penalties, including removal of my driving privileges. If I violate the agreement, I also understand that my parents will allow me greater driving privileges as I become more experienced and I demonstrate that I am always a safe and responsible driver.

I PLEDGE:

SIGNATURES

Drive: ___________________________ Date: ____________
Parent promise: ___________________________ Date: ____________
Parent promise: ___________________________ Date: ____________

www.cdc.gov/parentsarethekey

American Academy of Pediatrics
American Automobile Association
American Medical Association
Parents, Drivers, and Teens
• Loss of control, collision with a tree
• Teen Passenger 1 (no seatbelt)
  • Unresponsive at scene
  • Transferred via helicopter
  • Multiple face fractures (LeFort 2, orbit, bilateral mandible), left forearm fracture, ulna fracture, 10 cm occiput laceration, facial laceration, concussion
• Teen Passenger 2 (no seatbelt)
  • Flew from back seat to front
  • Questionable LOC at scene
  • Abrasions, puncture wounds to extremity
• Teen Driver (no seatbelt)
  • Ejected from vehicle
  • Facial lacerations
  • Tibia fx.
  • D/C to home from ER
• Teen Passenger 3 (SEATBELT)
  • No injuries
Other teen fads leading to injury seen in the media
It's a story some medical experts say should be on the radar of every parent, teacher, counselor, and coach. Kids choking themselves to get a rush.

Kay Quinn, KSDK  11:32 p.m. CST November 12, 2015
• “Gasp,” “pass out game,” “fainting game,” “Flatliner,” “Airplaning,” etc.
• Seeing a resurgence because of YouTube
• More kids doing it alone
• Can be high-achieving teens or pre-teens, way to experience a rush without getting in trouble

• **Warning Signs**
  – Increased need for secrecy
  – Finding belts and ties laying out or tied to bed
  – Ligature marks on neck
  – Bloodshot eyes
  – Confusion, headaches, dizziness

The Fire Challenge

• Pouring a flammable liquid onto self, then igniting. Often done in shower.

When we asked the teenager what he thought would happen when he set himself on fire, he said, "I don't know, I wasn't thinking really."

It seems teenagers will do anything these days, especially for a shot at fame.

Banana Peel Challenge becomes the Internet's latest fad
ksdk.com
"Ice and salt challenge" leaves 12-year-old Pittsburgh boy with second-degree burns
Dr. Frances Jensen  
Department of Neurology at the Perelman School of Medicine, University of Pennsylvania.  
Former Professor Neurology at Harvard Medical School,  
Director of Translational Neuroscience and Director of Epilepsy Research at Boston Children’s Hospital
“...take the lead, take control, and try to think for your teenage sons and daughters until their own brains are ready to take over the job.”
—Dr. Frances E. Jensen
Me with my teenagers (and my 9 year old)