Self-Harm in Teens

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Background

• No Conflicts of Interest to Disclose
• Completed Medical School Psychiatry Residency, and Child Psychiatry Fellowship
• Experience in inpatient, residential, and outpatient settings with adolescents
• Currently working on the Middle School Residential Unit and Acute Hospital Unit at Shodair Childrens Hospital
But enough about me.

Who are you?
Non-Verbal Communication

• The Ear Cup
• The Maya
• The Wrist Tap
• The Raised Hand
What is Self-Harm?

• Spectrum of activities and levels of danger
  • Most people think of cutting forearms with household objects like razors
  • Other forms – burning, punching walls, causing abrasions, overdosing, drinking too much, using drugs, smoking
  • “Culturally sanctioned” – piercings, tattooing
  • Not protecting health – not taking medications as prescribed, not flossing
  • Hiding it vs. letting others know
Non-Suicidal Self Injury

- Abbreviated NSSI
- Commonly term used in American and Canadian literature to describe “self-harm that is not suicidal in nature and is performed for the purpose of emotional regulation”
- Also defined as “deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes that are not socially sanctioned”
- The term Deliberate Self-Harm (DSH) is more commonly used in European and Australian literature
Age

• Prevalence rates of NSSI peak around 15-16 years of age and decline toward age 18
• Resolution in late adolescence or early adulthood “in most cases”
• NSSI in adolescence increases adult risk of long-term mental health issues, suicidality, and risk-taking behaviors

Will NSSI Persist Into Adulthood?

- European Child and Adolescent patients who presented with NSSI in early adolescence were re-evaluated in their early 20’s, and around half had stopped NSSI and half still had NSSI within the prior year.
- Earlier age of onset of NSSI and longer duration of NSSI during adolescence were significantly predictive of adult Borderline Personality Disorder
- Around half reported having had a suicide attempt
- Results worse than other studies, speculated to be “due to initial high psychiatric impairment of this sample in adolescence”

Gender

- 70% of those who self harm are female
- Females tend to cut or cause abrasions
- Males tend to punch walls
  - There’s a lot of wall punching that is not “for the purpose of self harm” but for the purpose of changing emotional state, but some is for self-harm

Self-Harm and the Teenage Brain

- Poor judgment
- Impulsivity
- Poorly developed coping skills
  - Fewer options and less practice
  - Some have strong social support, some do not (or do not perceive support)
TEEN'S BRAIN

The development of hormones-fueled limbic system begins between ages 10 to 12 and matures over the next several years.

Vulnerable to dangerous behaviors and serious mental disorders.

The most significant change taking place in an adolescent brain is the increase in communications among groups of neurons.

Sources:
- https://www.researchgate.net/publication/277935219_The_amazing_teen_brain
- https://en.wikipedia.org/wiki/Limbic_system
Judgment last to develop

The area of the brain that controls “executive functions” — including weighing long-term consequences and controlling impulses — is among the last to fully mature. Brain development from childhood to adulthood:

5-year-old brain  Preteen brain  Teen brain  20-year-old brain

*Dorsal lateral prefrontal cortex ("executive functions")*

Red/yellow: Parts of brain less fully mature

Blue/purple: Parts of brain more fully mature

Sources: National Institute of Mental Health;
Paul Thompson, Ph.D., UCLA Laboratory of Neuro Imaging

Thomas McKay | The Denver Post
What is truly harmful?

• Adolescents cannot accurately predict lethality
  • May think a few small cuts can kill them, or may think large amounts of blood will not
  • Similarly, difficulty predicting outcomes of overdosing (some kids think 4 Tylenol pills will kill them)
  • Most superficial lacerations will heal with basic first aid, but cuts through the skin need medical attention
  • But NSSI is rarely lethal
Types of Self Harm

- Suicidal
- Non-suicidal
- Main difference is INTENT
  - ex: both might cut wrists
Why Self-Harm?

- For emotional regulation / decreasing stress
  - Physical pain blocks out the emotional pain
  - Self-soothing
  - Distraction
  - “To feel alive”
- Because it works
- “For attention”
Methods of Self-Injury

- NSSI is typically cutting on forearms, but also includes other sites or burning self. (Anecdotally I also see a lot of picking scabs.)
- Note it is uncommon for an individual who engages in NSSI and is suicidal to use the same method for each purpose, and they are often able to verbalize the difference
  - Ex: superficial cutting of forearms as NSSI, and attempting to overdose as suicidality
Differentiating Suicidal vs. Non-Suicidal Self Injury

• How can you tell the difference?
  • ASK
  • “What are you trying to accomplish by self harming? Is it for the purpose of killing yourself?”
  • Not mutually exclusive - NSSI is associated with increased risk of future suicide attempts
• For the purpose of this talk we will focus on Non-Suicidal Self Injury
we're all addicted to something that takes the pain away.
Risk Assessment

- Warning Signs – immediate risk
- Risk Factors – increased long term risk but do not indicate current immediate risk
- Protective Factors - decrease risk
Warning Signs for Suicide (Immediate Risk)

- 1) Suicidal Intent
- 2) Looking for a way to do it
- 3) Hopelessness

For a list of expert-recommended warning signs, see the fact sheet at the Best Practices Registry for Suicide Prevention (BPR): http://www.sprc.org/bpr/section-II/warning-signs-suicide-prevention
Risk Factors for NSSI

- Correlates of NSSI include a history of sexual abuse, depression, anxiety, alexithymia, hostility, smoking, dissociation, suicidal ideation, and suicidal behaviors.


- Strongest: history of NSSI, Cluster B PDs, and hopelessness
  - Also: Prior SI, Exposure to peer NSSI, patient prediction, abuse, dysfunctional relationships, LGBTQ, and bullying

Risk Factors for Suicide

- Prior attempt
- NSSI
- Substance abuse
- Mood disorders
- Access to lethal means


For more: http://www.suicidology.org/ncpys/warning-signs-risk-factors
Risk Factors Common to NSSI and Suicidality

- History of trauma, abuse, or chronic stress
- High emotional sensitivity
- Few effective coping skills
- Feelings of isolation / perception of isolation
- Alcohol / substance abuse
- Mood or anxiety disorders
- Feeling worthless
Protective Factors

- Effective Mental Health Care
- Connectedness to individuals, family, community, and social institutions
- Problem-solving skills (anti-hopelessness)
- Contacts with caregivers

NSSI and Suicidality

- NSSI is a risk factor for suicidality
- The level of distress leading to NSSI is usually significantly lower than the level of distress leading to suicidality
- Many patients report NSSI is helpful to reduce distress, and in some who have considered suicide it is a way to lower distress to avoid attempting suicide

How often are patients both engaging in NSSI and truly suicidal?

- In NSSI users, 35-40% will also report some suicidality
  - This means over half of NSSI users do not have suicidality
- In NSSI users with suicidality, 80% of the time the NSSI precedes the suicidality

Prevalence Study 2005-2011

- “The search terms: self-injury, non-suicidal self-injury, NSSI, deliberate self-harm, DSH, self-harm, self-mutilation, parasuicide, prevalence, rates, adolescent, and adolescence” were used to locate articles. We restricted the search to peer reviewed, empirical articles published between January 1, 2005 and December 1, 2011… Articles were included if they were written in English, reported empirical data collected from adolescents (age range 11-18 years) within community or school settings… Studies were excluded if the sample included fewer than 100 participants or included populations with pervasive developmental disorders… Studies reporting prevalence within clinical (inpatient/outpatient/emergency department) studies were also excluded…”
Self-Injury Prevalence in Non-Clinical Adolescent Populations

My tips

• When I ask, “Any recent thoughts of self harm?” the Shodair patients are often vague. When I ask, “If 10 is totally wanting to self harm and 0 is not wanting to self harm at all, what is the highest it has been in the last 24 hours?” I often get a number that is not zero.

• I get much better information on zero to 10 scales than I do on binary “yes or no” questions

• “Do you think there is an adult you would tell if you were feeling unsafe?” Good to know who and if they are on good terms with the caregiver
My tips

• When I ask, ”Are you having suicidal thoughts?” the Shodair patients usually say no. When I ask, “If 10 is you totally want to kill yourself and 0 is you don’t want to kill yourself at all, what is the highest number you had in the last 24 hours?” I will often get a number between 3 and 5. Then follow up with assessing when it was highest why was it highest.

• I then like to ask, “How close did you come to acting on it?”
My tips

• We used to write the goals in the treatment plan as “no suicidality for one month,” which led to the clients feeling like they had to deny suicidality to be discharged. We revised the goals to say the client would "notify staff and safely manage suicidal thoughts for one month,” which led to improved communication and utilization of coping skills. When kids “think they are in trouble” they hide the behavior.
Recent Headline

• “Cutting and Self-Harm: Cry for Attention or Something More?”
  • Always a sign something is wrong, especially if they hide it (long sleeves, etc.)
  • More helpful to view it as communication that help is needed
  • “Her friends recently started cutting so I think she is just doing it because they are doing it.”
Biological Mechanisms

• You know what would be nice? A simple theory and quickly effective treatment.
• Multiple theories, generally with conflicting data

Summary: The Neurobiology of Non-suicidal Self-injury (NSSI): A review
Altered Physiological Reactivity Theory

- When stressed, do people with NSSI show more hyperarousal as measured by elevated skin conductance (sweating) and elevated heart rate?

- Not consistently – initial findings of yes were not found when study was replicated
Changes in Lipids

- “Associations between suicide and low levels of serum cholesterol have been shown repeatedly, although there are also studies reporting contrary findings.”
- (Doesn’t that make it not repeatedly?)
- “Low cholesterol levels and low levels of essential fatty acids have been associated with self-injury consistently. Nevertheless, since serum cholesterol levels are quite possibly influenced by factors like age, gender, medication or diet, they might not serve as reliable markers.”
Serotonin

• Wouldn’t it be nice to have one neurotransmitter that was easy to change, and changing it would make thing better?

• “Abnormalities within the serotonergic (5-HT) system have been mentioned repeatedly in the context of NSSI (McCloskey et al., 2009; Hankin et al., 2011; Pies & Popli, 1995). There is evidence that decreases in 5-HT are correlated with impulsive and aggressive behaviours, suicide attempts and depression.”
Serotonin, Part 2

• Other studies did not find associations between platelet serotonin and NSSI (Garland et al., 2007; Roaldset et al., 2010). No differences in the levels of 5-hydroxyindolacetic acid (5-HIAA), a serotonin metabolite, could be found between patients with and without NSSI (Stanley, 2010).

• Beware of animal studies and “experimentally reduced Serotonin activity”

• Maybe the data would be better if brain Serotonin was measured, but that gets messy

• Similar story for Dopamine
Cortisol

- Hormone released in response to stress
  - Helps with “fight or flight” – very helpful if true threat
  - Suppresses non-urgent healthy bodily functions like digestion and growth
  - Chronic stress disrupts the body’s natural balance, leading to anxiety, depression, stomach issues, sleep problems, etc.
  - People with NSSI and/or chronic stress can end up with low cortisol secretion
  - “Adrenal fatigue”
<table>
<thead>
<tr>
<th>Symptoms of High Cortisol Levels</th>
<th>Symptoms of Adrenal fatigue (Low Cortisol Levels)</th>
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</thead>
<tbody>
<tr>
<td>Wired or fatigued</td>
<td>Fatigue</td>
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<tr>
<td>High blood pressure</td>
<td>Worsening memory and concentration</td>
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<tr>
<td>Hyperglycemia</td>
<td>Difficulty sleeping (insomnia)</td>
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<tr>
<td>Worsening memory and concentration</td>
<td>Sugar and salt cravings</td>
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<td>Difficulty sleeping (insomnia)</td>
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<td>Decreased sex drive</td>
<td>Depressed mood</td>
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<td>Weight gain</td>
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<td>Bone and muscle loss</td>
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<td>Weakened immune response</td>
<td>Anxiety</td>
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<td>Irritability</td>
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Cortisol

- Consistent results from studies on cortisol in individuals with NSSI showed a reduced cortisol secretion. The HPA-axis interacts with endogenous opioids and serotonergic mechanisms, and is involved with the level of secretion of cortisol. Experiencing stress is associated with an elevated secretion of cortisol (Heim et al., 2000). According to Heim et al. (2000), post-traumatic stress disorder (PTSD), chronic stress and stress-related bodily disorders are correlated with a low baseline cortisol secretion. In a recent study Kaess et al. (2012) reported, that adolescents who engaged in NSSI (n=14) showed a hyporesponsive HPA-axis in stressful situations, compared to healthy controls (n=14).
Endogenous Opioids

• Neurotransmitters that cause natural pain relief
• “Natural High”
  • Also known as endorphins
  • Endorphins – “any of a group of hormones secreted within the brain and nervous system and having a number of physiological functions. They are peptides that activate the body’s opiate receptors, causing an analgesic effect”
  • Fun names like alpha-endorphin and beta-endorphin
Pain signal:

The pain signal is transmitted from brain cell to brain cell.

Action of endorphins on brain signal:

Endorphins combine with receptors to block the transmission of pain.
Endogenous Opioids

- Endogenous opioids released from physical pain (like NSSI) have a relieving effect on both physical and emotional pain.
- People who engage in self-harm may have naturally lower levels of endogenous opioids, so their self-harm serves the function of raising their endogenous opioids to a more normal level.
Endogenous Opioids

• “Lower levels of endogenous opioids were found in individuals with NSSI repeatedly and could possibly explain an “addictive quality” of these behaviours. Endogenous opioids are associated with various disorders, like BPD or pervasive developmental disorders (PDD) of which NSSI and self-mutilation are considered to be symptoms. Opioids are involved in pain-perception and addictive behaviours. Addictive qualities of NSSI have been suggested in past studies, thus underlining the possible importance of endogenous opioids in NSSI. Altered opioid levels can be found in patients with a history of repeated NSSI…”
Endogenous Opioids

• “According to a homeostasis model of NSSI, childhood neglect and genetic vulnerability lead to a chronically lower level of endogenous opioids, which in the event of stress can be restored by engaging in NSSI. In a study of N=29 patients who had committed suicide attempts and were diagnosed with a Cluster B personality disorder (n=14 with NSSI, n=15 without NSSI), Stanley et al. (2010) found that cerebrospinal fluid β-endorphin and met-enkephalin levels of endogenous opioids were significantly lower in patients with a history of NSSI.”
Exercise gives you endorphins.
Endorphins make you happy.
Happy people don't shoot their husbands,

they just don't.
Summary of Review Article

“In summary, the most consistent results from studies on the involvement of neurotransmitters in NSSI are reduced levels of cortisol and endogenous opioids, which suggest an altered stress response. Findings on other neurotransmitters like serotonin and dopamine are inconsistent and imply further research in this field.”

Summary: The Neurobiology of Non-suicidal Self-injury (NSSI): A review
Pain Offset Theory

- Cutting or similar methods cause pain
  - Using the body’s system to alert injury
- Do people who self-injure feel less pain?
  - No. Studies show they are able to endure more pain than other people, but they still feel pain and find it very unpleasant.

Pain Offset Theory

• “Once something that causes pain (knife, flame, etc.) is removed… it causes people to feel better.”
• “Pain offset does not simply return people to how they were feeling before the pain began. Instead, they go far beyond the previous point into a more pleasant feeling labelled “relief.” This is known as Pain Offset Relief.”

Pain Offset Theory

- Recent studies on Pain Offset Relief show that pain itself does not make people feel better, but something about the removal of pain does.
- Self-injury is not “just a distraction”
- People who self-injure to not “enjoy the pain” but feel relief after the pain
- Happens in everyone, not just people who are “wired differently”
  - Social contagion, primarily in teens
Pain Offset and the Brain

- People report they self-injure to reduce emotional pain
- Significant overlap between physical and emotional pain parts of the brain – it is hard for brain to tell the difference

How the Mind Processes Pain

ANTERIOR CIRCULATORY CORTEX
Regulates unpleasant feelings when things go wrong, either physically or emotionally. People who are highly sensitive to pain have greater activity here.

SOMATOSENSORY CORTEX
Registers which body part is in pain and the intensity of that pain. Less activity here when patients focus their attention away from their pain.

INSULAR CORTEX
Integrates sensory, emotional, and cognitive states; feels empathy for others’ pain.

THALAMUS
Receives pain signals from spinal cord and relays them to higher brain regions.

PERIAQUEDUCTAL GRAY
An area rich in natural opioids that acts as a pain reliever.

AMYGDALA
Anticipates pain and reacts to perceived threats.

PREFRONTAL CORTEX
Processes pain signals and helps plan action. Active when trying to consciously reduce pain.

MEDIAL PREFRONTAL CORTEX
Focuses on negative personal implications of pain. Heightened activity seen in anxious people.

RIGHT LATERAL ORBITAL CORTEX
Evaluates sensory stimuli and decides on response, particularly if fear is involved. Mindfulness meditation calms down this response.

NUCLEUS ACCUMBENS
Reinforces dopamine and serotonin during pleasure or pain.

Therapeutic Approaches

44%
Decrease in pain reported by 15 undergraduates when they focused on a level-one’s photo while exposed to a heated probe.

40%
Decrease in pain intensity reported by 10 people who learned mindfulness meditation and used it while exposed to a heated probe.

30%
Percentage of people in a study of 422 fibromyalgia patients who reported less pain after receiving cognitive behavioral therapy.

Pain Offset and the Brain

- Increase in physical pain (self-injury) then stopping causing the pain (relief) may be interpreted by the brain as a reduction in emotional pain also.
- Emotional pain is hard to turn off but physical pain (that is self-induced) is easier to turn off.
- Physical pain offset may cause emotional release offset.
- Pain does not make people feel better, but pain offset does.

Exhibit 1: Social and Physical Pain Produce Similar Brain Responses

Brain scans captured through functional magnetic resonance imaging (fMRI) show the same areas associated with distress, whether caused by social rejection or physical pain. The dorsal anterior cingulate cortex (highlighted at left) is associated with the degree of distress; the right ventral prefrontal cortex (highlighted at right) is associated with regulating the distress.

Illustration: Samuel Valasco

Pain Offset Theory

- Does this make sense?
- Could this theory be related to the endogenous opioids theory?
  - Not mutually exclusive
  - My analogy: jogging
Treatment

• A systematic review and meta-analysis from 2015 identified dialectical behavioral therapy for adolescents (DBT-A), cognitive behavioral therapy (CBT) and mentalization-based treatment for adolescents (MBT-A) to be effective for the therapy of NSSI in adolescents

• No specific treatment was superior to others

Treatment

• Important components of psychotherapy include:
  • Establishment of treatment motivation
  • Psychoeducation
  • Identification of factors that trigger or maintain NSSI
  • Conveying alternative behavioral skills and conflict resolution strategies
  • Adherence to guidelines for treating comorbid mental health issues

Treatment

• The evidence for using medications for NSSI is insufficient
• Medications may be helpful for comorbid mental conditions, but none are FDA approved specifically for self harm
  • No one medication is most helpful – can target depression, anxiety, or impulsivity
Treatment

- Negative reactions of adults toward NSSI of an adolescent can lead to avoidance of help-seeking in the future
  - Better to try to understand and work through the stress than to have them feel embarrassed then try to hide it

Do patients with self harm need hospitalization?

- Not always
  - Intent
  - Chronicity
  - Amount of harm
  - But patients with active suicidality NEED HOSPITALIZATION
Will NSSI turn into suicide?

- This study examined the associations of NSSI and established suicide risk factors to attempted suicide in four samples: adolescent psychiatric patients ($n = 139$), adolescent high school students ($n = 426$), university undergraduates ($n = 1,364$), and a random-digit dialing sample of United States adults ($n = 438$). All samples were administered measures of NSSI, suicide ideation, and suicide attempts; the first three samples were also administered measures of depression, anxiety, impulsivity, and borderline personality disorder (BPD). In all four samples, NSSI exhibited a robust relationship to attempted suicide (median $\Phi_i = .36$). Only suicide ideation exhibited a stronger relationship to attempted suicide (median $\Phi_i = .47$), whereas associations were smaller for BPD (median $r_{pb} = .29$), depression (median $r_{pb} = .24$), anxiety (median $r_{pb} = .16$), and impulsivity (median $r_{pb} = .11$). When these known suicide risk factors and NSSI were simultaneously entered into logistic regression analyses, only NSSI and suicide ideation maintained significant associations with attempted suicide. Results suggest that NSSI is an especially important risk factor for suicide.

Prognosis

- Depends on intention, chronicity, stressors, responsiveness to psychotherapy and learning other coping skills
- Often resolves with treatment
- But it is a risk factor for future suicide attempts
- Indicates a high level of stress and undeveloped or insufficient alternative coping skills
Special Populations

- Autism – poor communication skills, may be communication (ex: hitting means displeasure) or sensation seeking (head-banging when unhappy)
  - Also likely “wired differently”
- Intellectual Disability – again, poor communication and may be “wired differently”
- Sexual Abuse
- Psychosis
Summary

• NSSI may or may not be associated with suicidality
• Adolescents have poor judgment, impulsivity, and poorly developed coping skills
• Ask about intent
• Primary goals are decreasing distress and safety
Additional Tangential Rants

- Work at the population level to lower ACEs
- Fund Mental Health
- Fund DFS
- Prevent Pregnancy