Addressing the National Emergency of Self-Injury & Suicide Among Children & Adolescents

Daniel P. Dickstein MD FAAP
Chief of Child & Adolescent Psychiatry
Director, PediMIND Program

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Disclosures:

- **Current funding:**
  - R01MH111542 (brain mechanisms of irritability in children)
  - R01MH110379 (brain mechanisms of NSSI & youth suicide)
  - K24MH110402
  - Hood Foundation Major Grant (brain mechanisms of irritability and suicide in children)
- **Past funding**:
  - NARSAD
  - Am Foundation for Suicide Prevention
  - NIMH BRAINS R01MH087513, R21/33MH095850, K22MH074945
  - **No industry support**

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Learning Objectives:

(1) To review the magnitude of the related but distinct problems of youth suicide and non-suicidal self-injury (NSSI, aka "self-cutting")
(2) What can be done to address youth suicide now?
(3) How can we work together now to ensure a brighter future?

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COVID has exacerbated need for better child & adolescent mental healthcare

Pediatricians, Child and Adolescent Psychiatrists and Children's Hospitals Declare National Emergency in Children's Mental Health

AACAP, AAP, and CHA call on policymakers at all levels of government to act swiftly to address mental health crisis

Washington, D.C., October 19, 2021 – Today, the American Academy of Pediatrics (AAP), the American Academy of Child and Adolescent Psychiatry (AACAP) and the Children's Hospital Association (CHA) together representing more than 77,000 physician members and more than 200 children's hospitals, **declared** a national state of emergency in child and adolescent mental health and are calling on policymakers to join them.

FOR IMMEDIATE RELEASE
December 7, 2021

Contact: HHS Press Office
202-690-6343
media@hhs.gov

U.S. Surgeon General Issues Advisory on Youth Mental Health Crisis Further Exposed by COVID-19 Pandemic

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Opinion

Why Are Young Americans Killing Themselves?

Suicide is now their second-leading cause of death.

By Richard A. Friedman
Dr. Friedman is a psychiatrist.

Jan 6, 2020

Lean HOSPITAL

Teenagers and young adults in the United States are being ravaged by a mental health crisis — and we are doing nothing about it. As of 2017, statistics show that an alarming number of them are suffering from depression and dying by suicide. In fact, suicide is now the second leading cause of death among young people, surpassed only by accidents.

After declining for nearly two decades, the suicide rate among Americans ages 10 to 24 jumped 56 percent between 2007 and 2017, according to data from the Centers for Disease Control and Prevention. And for the first time the gender gap in suicide has narrowed: Though the numbers of suicides are greater in males, the rates of suicide for female youths increased by 12.7 percent each year, compared with 7.1 percent for male youths.

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At the same time, the rate of teen depression shot up 63 percent, an alarming but not surprising trend given the link between suicide and depression: In 2017, 13 percent of teens reported at least one episode of depression in the past year, compared with 8 percent of teens in 2007, according to the National Survey on Drug Use and Health.

How is it possible that so many of our young people are suffering from depression and killing themselves when we know perfectly well how to treat this illness? If thousands of teens were dying from a new infectious disease or a heart ailment, there would be a public outcry and a national call to action.

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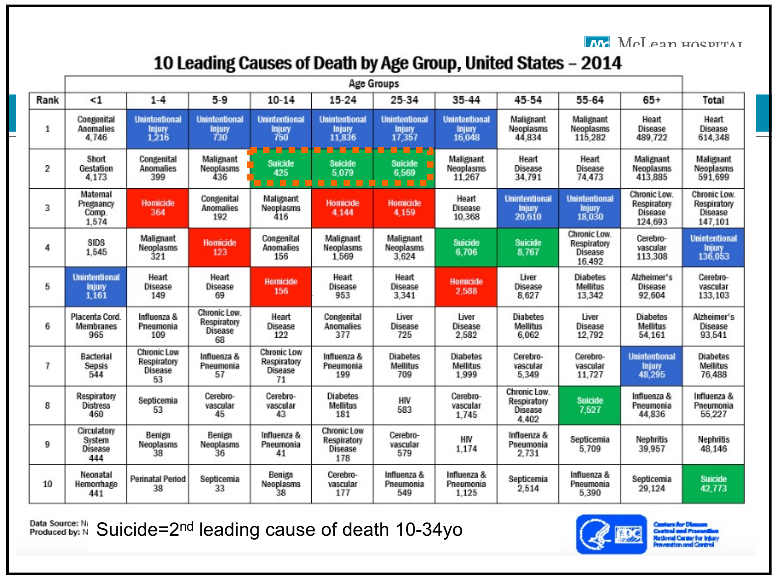
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10 Leading Causes of Death by Age Group, United States – 2014

Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
	Age Groups										
1	Congenital Anomalies 4,746	Unintentional Injury 1,216	Unintentional Injury 730	Unintentional Injury 750	Unintentional Injury 11,836	Unintentional Injury 17,357	Unintentional Injury 16,048	Malignant Neoplasms 44,834	Malignant Neoplasms 115,282	Heart Disease 489,722	Heart Disease 614,348
2	Short Gestation 4,173	Congenital Anomalies 399	Malignant Neoplasms 436	Suicide 425	Suicide 5,079	Suicide 6,569	Malignant Neoplasms 11,267	Heart Disease 34,791	Heart Disease 74,473	Malignant Neoplasms 413,885	Malignant Neoplasms 591,699
3	Maternal Pregnancy Comp. 1,574	Homicide 364	Congenital Anomalies 192	Malignant Neoplasms 416	Homicide 4,144	Homicide 4,159	Heart Disease 10,368	Unintentional Injury 20,610	Unintentional Injury 18,030	Chronic Low. Respiratory Disease 124,693	Chronic Low. Respiratory Disease 147,101
4	SIDS 1,545	Malignant Neoplasms 321	Homicide 123	Congenital Anomalies 156	Malignant Neoplasms 1,569	Malignant Neoplasms 3,624	Suicide 6,706	Suicide 8,767	Chronic Low. Respiratory Disease 16,492	Cerebro-vascular 113,308	Unintentional Injury 136,053
5	Unintentional Injury 1,161	Heart Disease 149	Heart Disease 69	Homicide 156	Heart Disease 953	Heart Disease 3,341	Homicide 2,588	Liver Disease 8,627	Diabetes Mellitus 13,342	Alzheimer's Disease 92,604	Cerebro-vascular 133,103
6	Placenta Cord. Membranes 965	Influenza & Pneumonia 109	Chronic Low. Respiratory Disease 68	Heart Disease 122	Congenital Anomalies 377	Liver Disease 725	Liver Disease 2,582	Diabetes Mellitus 6,062	Liver Disease 12,792	Diabetes Mellitus 54,161	Alzheimer's Disease 93,541
7	Bacterial Sepsis 544	Chronic Low Respiratory Disease 53	Influenza & Pneumonia 57	Chronic Low Respiratory Disease 71	Influenza & Pneumonia 199	Diabetes Mellitus 709	Diabetes Mellitus 1,999	Cerebro-vascular 5,349	Cerebro-vascular 11,727	Unintentional Injury 48,295	Diabetes Mellitus 76,488
8	Respiratory Distress 460	Septicemia 53	Cerebro-vascular 45	Cerebro-vascular 43	Diabetes Mellitus 181	HIV 583	Cerebro-vascular 1,745	Chronic Low. Respiratory Disease 4,402	Suicide 7,527	Influenza & Pneumonia 44,836	Influenza & Pneumonia 55,227
9	Circulatory System Disease 444	Benign Neoplasms 38	Benign Neoplasms 36	Influenza & Pneumonia 41	Chronic Low Respiratory Disease 178	Cerebro-vascular 579	HIV 1,174	Influenza & Pneumonia 2,731	Septicemia 5,709	Nephritis 39,957	Nephritis 48,146
10	Neonatal Hemorrhage 441	Perinatal Period 38	Septicemia 33	Benign Neoplasms 38	Cerebro-vascular 177	Influenza & Pneumonia 549	Influenza & Pneumonia 1,125	Septicemia 2,514	Influenza & Pneumonia 5,390	Septicemia 29,124	Suicide 42,773

Data Source: N
Produced by: N

Suicide=2nd leading cause of death 10-34yo

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

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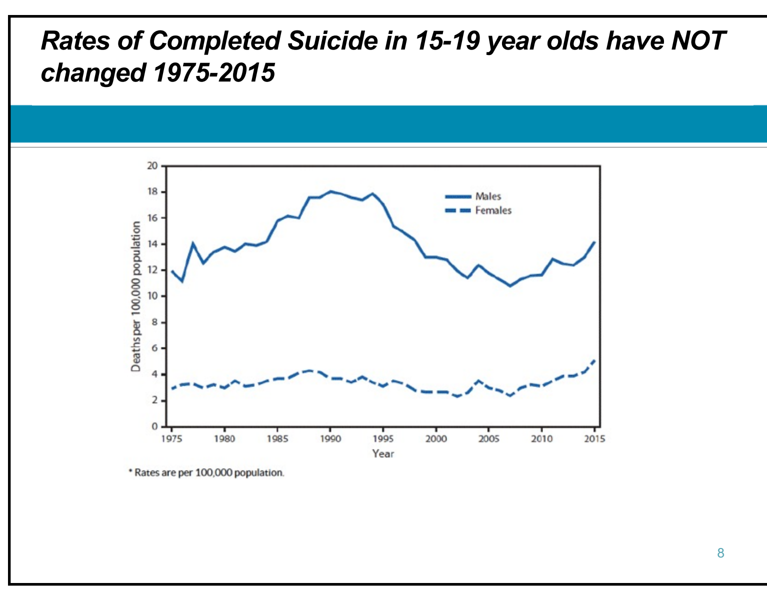
Rates of Completed Suicide in 15-19 year olds have NOT changed 1975-2015



* Rates are per 100,000 population.

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Completed Suicide: The Tip of the Iceberg

- **Suicide 2nd leading cause of death 10-33yo**
- Past year HS students (2019 CDC YRBS):
- 18.8% serious SI
- 15.7% made suicide plan
- 8.9% made suicide attempt (SA)
- 2.5% sought medical attention for suicide attempt (SA)

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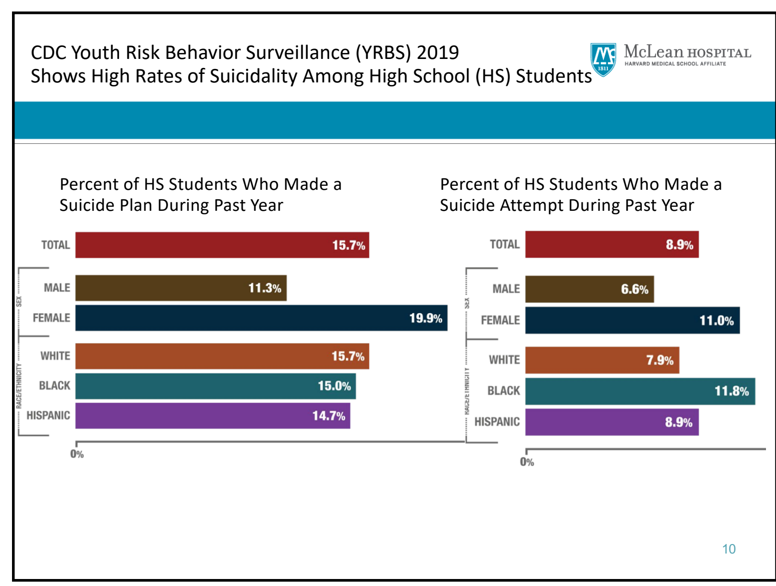

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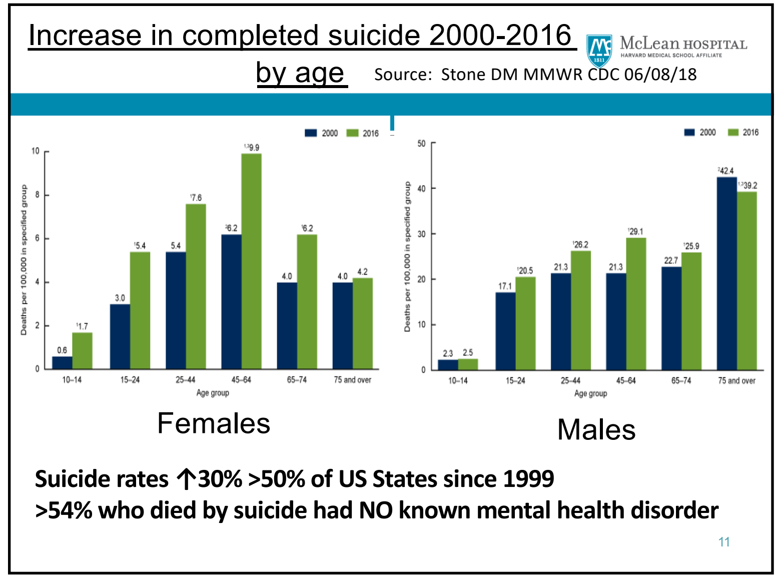

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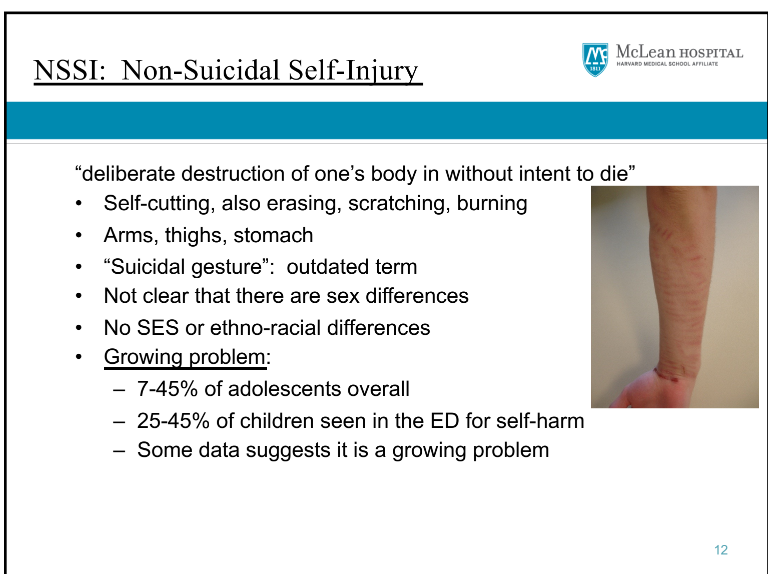

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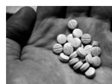
Relationship between NSSI & Suicide

- NSSI: by definition no intent to die
- But…a risk factor for suicide attempt:
  - TORDIA baseline NSSI predicts future SA *better than baseline hx of SA* (HR=7.31 p<0.001; Asarnow 2011)
  - Baseline NSSI predicted future SA among teens *despite controlling for past SA* (OR=7.5, p=0.009, Cox 2012)
  - History of NSSI ↑x7 risk for SA in n=399 high school students *despite controlling for prior depression, SAs, and gender* (Guan 2012)
- Problem: Insufficient understanding of the mechanisms of NSSI & suicide



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(1) To review the magnitude of the related but distinct problems of youth suicide and non-suicidal self-injury (NSSI, aka "self-cutting")
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NIMH TOOLKIT

asQ Ask Suicide-Screening Questions

Suicide Risk **Screening Tool**

Ask the patient:

1. **In the past few weeks, have you wished you were dead?**	❍ Yes	❍ No
2. **In the past few weeks, have you felt that you or your family would be better off if you were dead?**	❍ Yes	❍ No
3. **In the past week, have you been having thoughts about killing yourself?**	❍ Yes	❍ No
4. **Have you ever tried to kill yourself?**	❍ Yes	❍ No

If yes, how? ______________________________

____

____

When? ______________________________

____

If the patient answers **Yes** *to any of the above, ask the following acuity question:*

5. **Are you having thoughts of killing yourself right now?**	❍ Yes	❍ No

If yes, please describe: ______________________________

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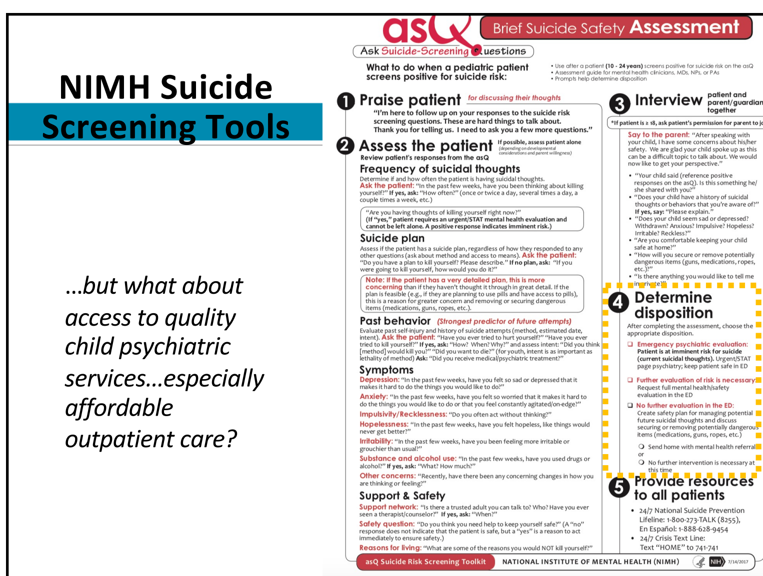
NIMH Suicide Screening Tools

...but what about access to quality child psychiatric services...especially affordable outpatient care?



asQ Ask Suicide-Screening Questions

Brief Suicide Safety **Assessment**

What to do when a pediatric patient screens positive for suicide risk:

1 Praise patient *for discussing their thoughts*

"I'm here to follow up on your responses to the suicide risk screening questions. These are hard things to talk about. Thank you for telling us. I need to ask you a few more questions."

2 Assess the patient

Frequency of suicidal thoughts

Suicide plan

Past behavior *(Strongest predictor of future attempts)*

Symptoms

Support & Safety

3 Interview *patient and parent/guardian together*

4 Determine disposition

5 Provide resources to all patients

asQ Suicide Risk Screening Toolkit — NATIONAL INSTITUTE OF MENTAL HEALTH (NIMH)

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Self-Cutting: What can we do now?

- Ask….don't assume:
  - *Have you ever cut yourself on purpose?*
  - *When?*
  - *Why?*
- Assess for suicide (which may be separate prob)
- Don't reflexively send them to the ER (if possible depending on your setting)
- Don't reflexively assume this is a personality disorder
- Substitution: Ice bath? Etc.

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Parent-Adolescent Agreement About Adolescents' Suicidal Thoughts

n HOSPITAL
L SCHOOL AFFILIATE

Jason D. Jones, PhD,[a] Rhonda C. Boyd, PhD,[a,b] Monica E. Calkins, PhD,[b] Annisa Ahmed, BA,[a] Tyler M. Moore, PhD,[b] Ran Barzilay, MD, PhD,[a,b] Tami D. Benton, MD,[a] Raquel E. Gur, MD, PhD[b]

Pediatrics 2019

abstract

OBJECTIVES: To examine agreement between parent and adolescent reports of adolescents' suicidal thoughts and explore demographic and clinical factors associated with agreement in a large community sample.

METHODS: Participants included 5137 adolescents 11 to 17 years old (52.1% girls; 43.0% racial minority) and a collateral informant (97.2% parent or stepparent) from the Philadelphia Neurodevelopmental Cohort. Families were recruited from a large pediatric health care network. Adolescents and parents completed a clinical interview that included questions about adolescents' lifetime suicidal thoughts.

RESULTS: Agreement was moderate for thoughts of killing self (κ = 0.466) and low for thoughts of death or dying (κ = 0.171). Discrepancies stemmed from both parental unawareness of suicidal thoughts reported by adolescents and adolescent denial of suicidal thoughts reported by parents. Fifty percent of parents were unaware of adolescents' thoughts of killing themselves, and 75.6% of parents were unaware of adolescents' recurrent thoughts of death. Forty-eight percent of adolescents denied thoughts of killing themselves, and 67.5% of adolescents denied thoughts of death reported by parents. Several demographic (eg, age) and clinical (eg, treatment history) characteristics were associated with agreement.

CONCLUSIONS: Early identification and intervention hinge on reliable and valid assessment of suicide risk. The high prevalence of parental unawareness and adolescent denial of suicidal thoughts found in this study suggests that many adolescents at risk for suicide may go undetected. These findings have important clinical implications for pediatric settings, including the need for a multi-informant approach to suicide screening and a personalized approach to assessment based on empirically derived risk factors for unawareness and denial.

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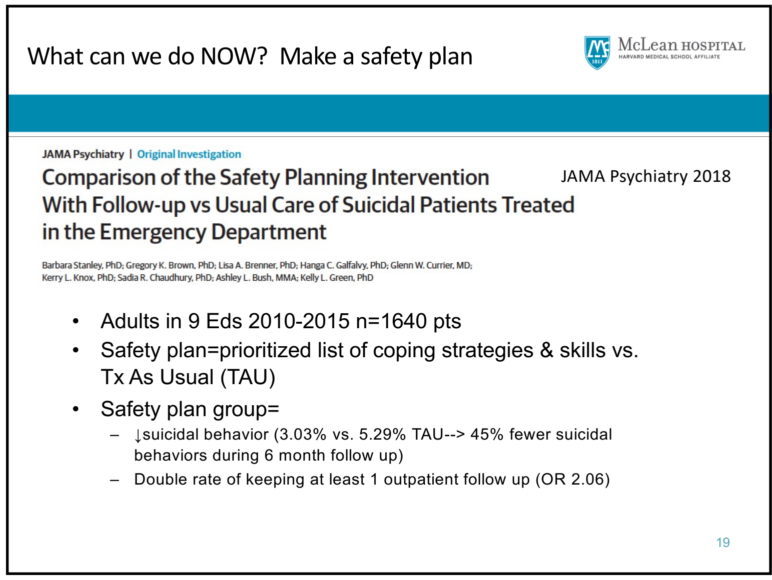

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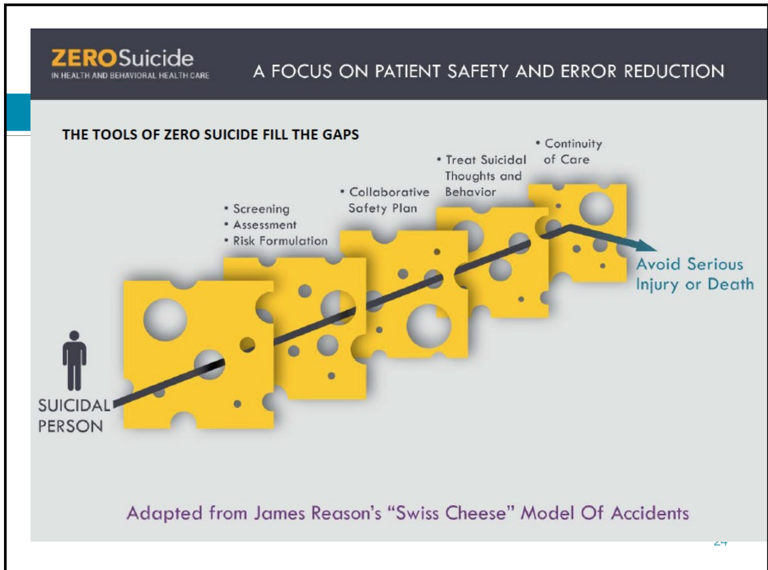

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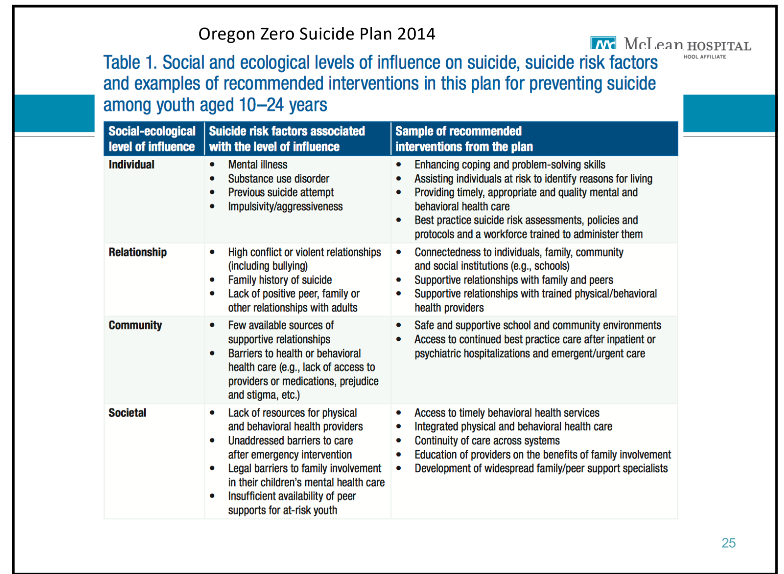
Oregon Zero Suicide Plan 2014

McLean HOSPITAL

Table 1. Social and ecological levels of influence on suicide, suicide risk factors and examples of recommended interventions in this plan for preventing suicide among youth aged 10–24 years

Social-ecological level of influence	Suicide risk factors associated with the level of influence	Sample of recommended interventions from the plan
Individual	• Mental illness • Substance use disorder • Previous suicide attempt • Impulsivity/aggressiveness	• Enhancing coping and problem-solving skills • Assisting individuals at risk to identify reasons for living • Providing timely, appropriate and quality mental and behavioral health care • Best practice suicide risk assessments, policies and protocols and a workforce trained to administer them
Relationship	• High conflict or violent relationships (including bullying) • Family history of suicide • Lack of positive peer, family or other relationships with adults	• Connectedness to individuals, family, community and social institutions (e.g., schools) • Supportive relationships with family and peers • Supportive relationships with trained physical/behavioral health providers
Community	• Few available sources of supportive relationships • Barriers to health or behavioral health care (e.g., lack of access to providers or medications, prejudice and stigma, etc.)	• Safe and supportive school and community environments • Access to continued best practice care after inpatient or psychiatric hospitalizations and emergent/urgent care
Societal	• Lack of resources for physical and behavioral health providers • Unaddressed barriers to care after emergency intervention • Legal barriers to family involvement in their children's mental health care • Insufficient availability of peer supports for at-risk youth	• Access to timely behavioral health services • Integrated physical and behavioral health care • Continuity of care across systems • Education of providers on the benefits of family involvement • Development of widespread family/peer support specialists

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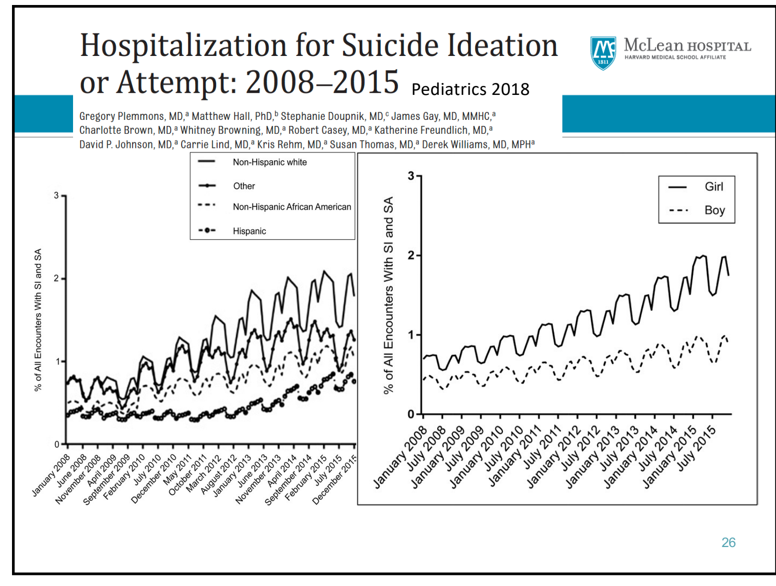

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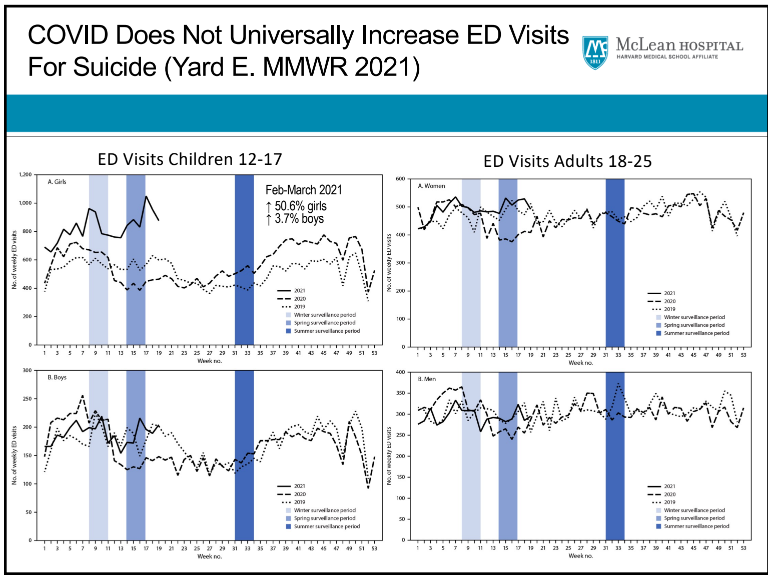

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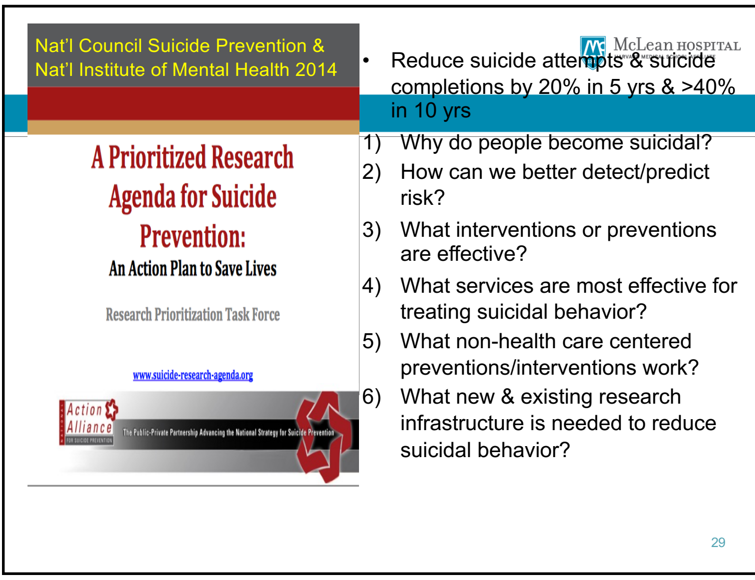

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Risk Factors for Suicidal Thoughts & Behaviors: A Meta-analysis of 50 Years of Research (Franklin JC Psychol Bull 2017)

McLean HOSPITAL
HARVARD MEDICAL SCHOOL AFFILIATE

Top 5 Broad Risk Factor Categories in terms of popularity

	Pre-1985		1985-1994		1995-2004		2005-2014	
Rank	Category	% ES	Category	% ES	Category	% ES	Category	% ES
1	Demographics	29.73	Internalizing	29.89	Internalizing	28.26	Internalizing	22.81
2	Internalizing	14.86	Prior STBs	13.88	Externalizing	14.67	Demographics	19.14
3	Prior STBs	10.81	Demographics	11.03	Prior STBs	11.85	Externalizing	16.02
4	Externalizing	9.46	Externalizing	10.68	Demographics	11.85	Prior STBs	11.52
5	Social Factors	5.41	Social Factors	9.25	Social Factors	8.37	Social Factors	9.61
Total		70.27		74.73		75.00		79.10

Take home: 50 yrs of research→ Same 5 factors→ Prediction little better than chance

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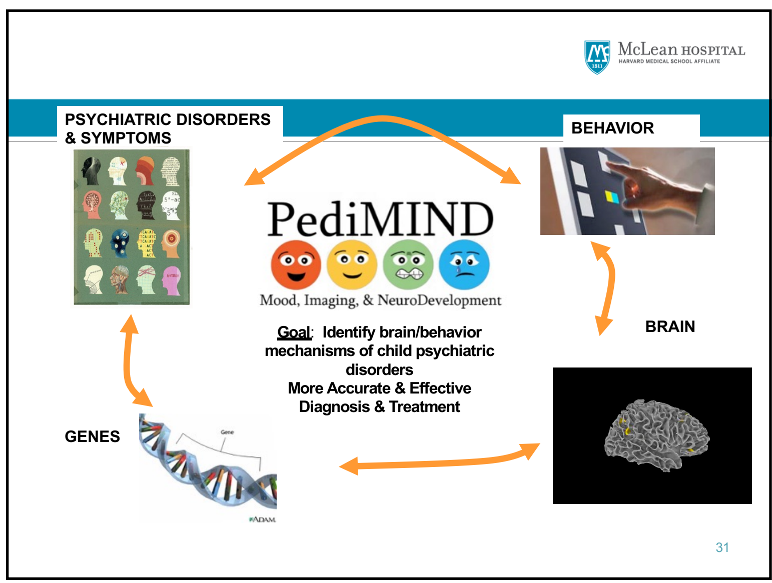

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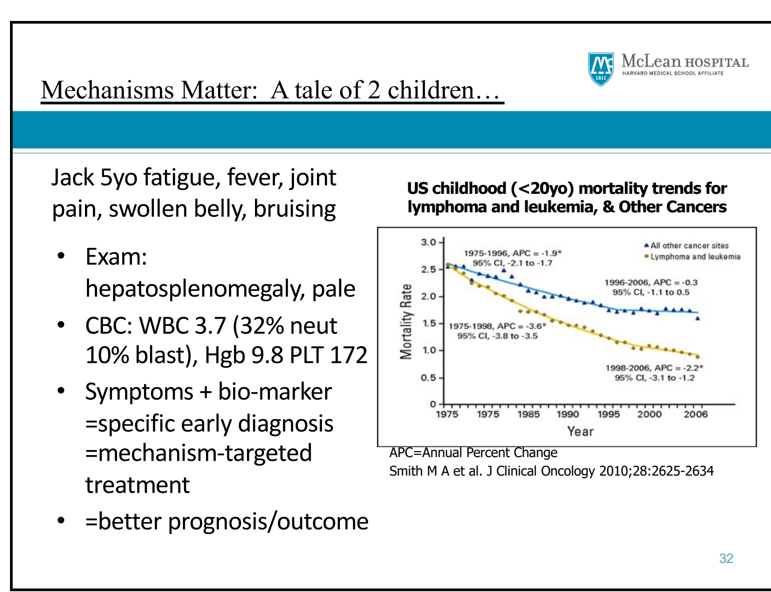

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Mechanisms Matter: A tale of 2 children…

Riley 8yo "very moody"

- Irritable/angry/destructive
- Sad/sullen/wants to die
- Hyper/silly/goofy
- Therapy at 4 for anger and not following directions
- Treatment at 6 for anxiety with SSRI + therapy led to hospitalization for out of control behavior.

Test to determine what diagnosis(es)?
…treatment?
…prognosis?
…risk for suicide?
…need for ER evaluation?
…need for inpatient psychiatric hospitalization?

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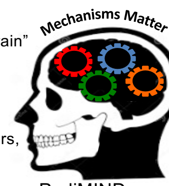
What can we do NOW to make the FUTURE brighter?
PediMIND Program Research (www.PEDIMIND.org)

- Following the example of childhood leukemia—where better understanding of biological mechanisms has transformed childhood leukemia from fatal for all kids, to now 5-year survival over 95%
- PediMIND Program seeks to improve our understanding of brain/behavior mechanisms underlying youth suicide, non-suicidal self-injury (NSSI, ie self-cutting), and irritability—that could ultimately improve how we diagnose and treat these most important child mental health issues.
- Mechanisms matter:

1) Mechanism-based prediction of NSSI and suicide
2) Mechanism-based treatment for NSSI and suicide
3) Computer assisted cognitive remediation—aka "retraining the brain"
4) Targeted/novel medications
5) Improved/targeted therapy

- PediMIND program values partnership with clinicians (nurses, SW, MDs, PhDs), families, teachers/schools/school counselors, community organizations, & funders.



PediMIND.org

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SA vs. NSSI: Dogma & Data

- Similar theoretical models for youth suicide and NSSI:
  1. Inter-personal stress vs. intra-psychic conflict
  2. Emotion generation/recognition
  3. "Cold cognition": decision-making, reward, impulsivity
  4. "Emotion regulation" as final common pathway
- Few studies of NSSI-only vs. SA-only youths
- Few studies of brain/behavioral mechanisms underlying use these theories

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Photo source: http://www.asiaone.com/a1media/health/03Mar08/images/self-cutting-runny-edit.jpg

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NSSI-only vs. SA-only vs. TDC Youths

Participants:

1) NSSI-only: cutting in the past month with more than 5 lifetime episodes, no SA
2) SA-only: suicide attempt in the past month, no NSSI
3) HC: no mental health history in themselves of 1st degree relatives

- IQ >70; English fluency in the teenage participant

Outcomes:

- Psychopathology/demographics
- Behavioral task performance

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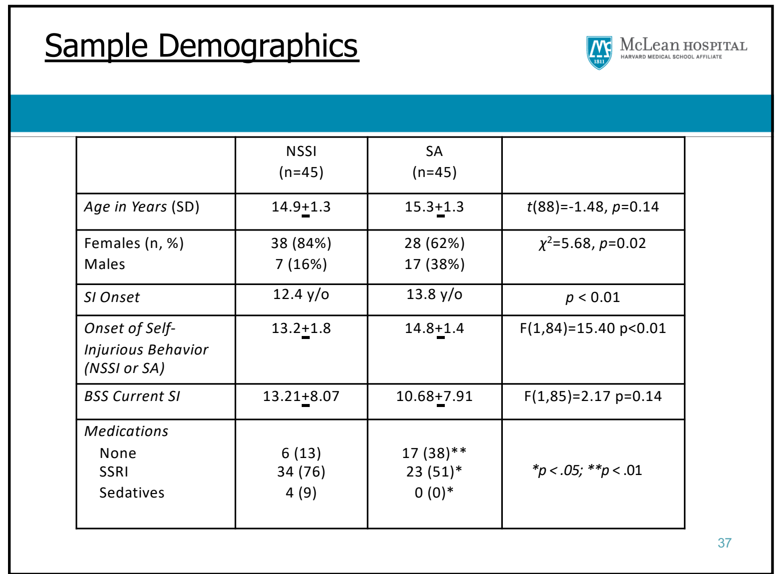

Sample Demographics

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HARVARD MEDICAL SCHOOL AFFILIATE

	NSSI (n=45)	SA (n=45)	
Age in Years (SD)	14.9±1.3	15.3±1.3	*t*(88)=-1.48, *p*=0.14
Females (n, %) Males	38 (84%) 7 (16%)	28 (62%) 17 (38%)	χ^2=5.68, *p*=0.02
SI Onset	12.4 y/o	13.8 y/o	*p* < 0.01
Onset of Self-Injurious Behavior (NSSI or SA)	13.2±1.8	14.8±1.4	F(1,84)=15.40 p<0.01
BSS Current SI	13.21±8.07	10.68±7.91	F(1,85)=2.17 p=0.14
Medications None SSRI Sedatives	 6 (13) 34 (76) 4 (9)	 17 (38)** 23 (51)* 0 (0)*	**p < .05; **p < .01*

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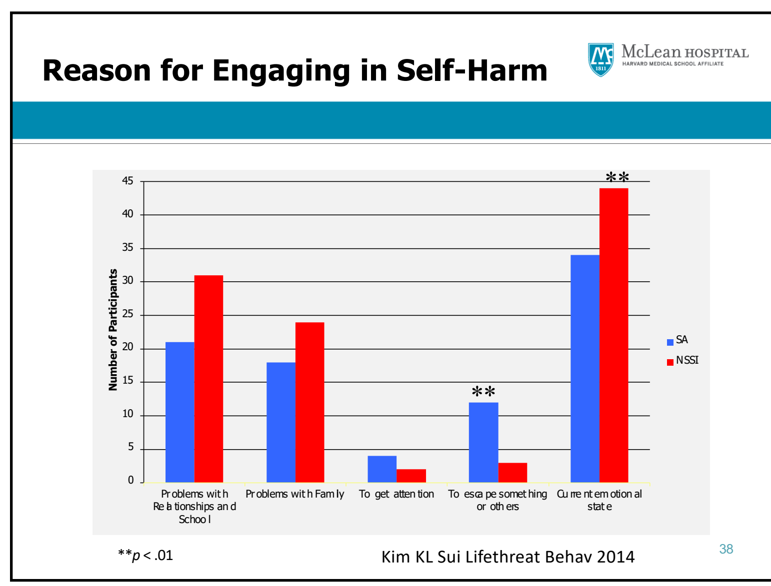

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Prisoner's Dilemma Task: Peer Acceptance & Rejection

- Simulates social situations using reciprocal economic exchange
- (In English): Players win money depending on whether they and the other player decide to cooperate or not cooperate ("defect")
- Each player's decision is revealed after every round
- Allows examination of players':
  - (a) Play (do they cooperate/work together vs. defect/reject peer)

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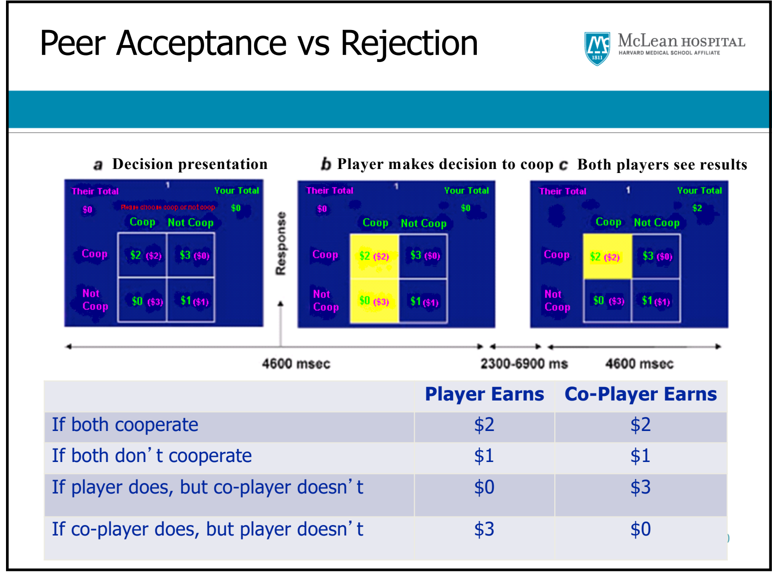

Peer Acceptance vs Rejection

	Player Earns	Co-Player Earns
If both cooperate	$2	$2
If both don't cooperate	$1	$1
If player does, but co-player doesn't	$0	$3
If co-player does, but player doesn't	$3	$0

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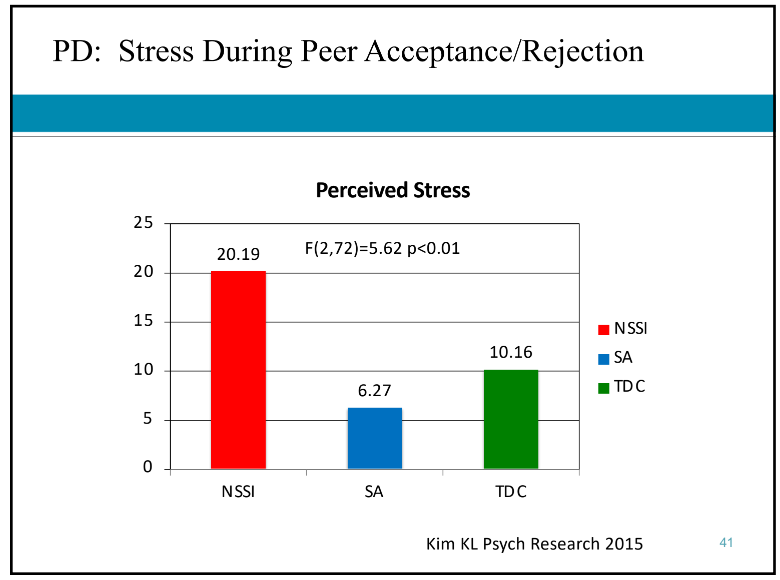

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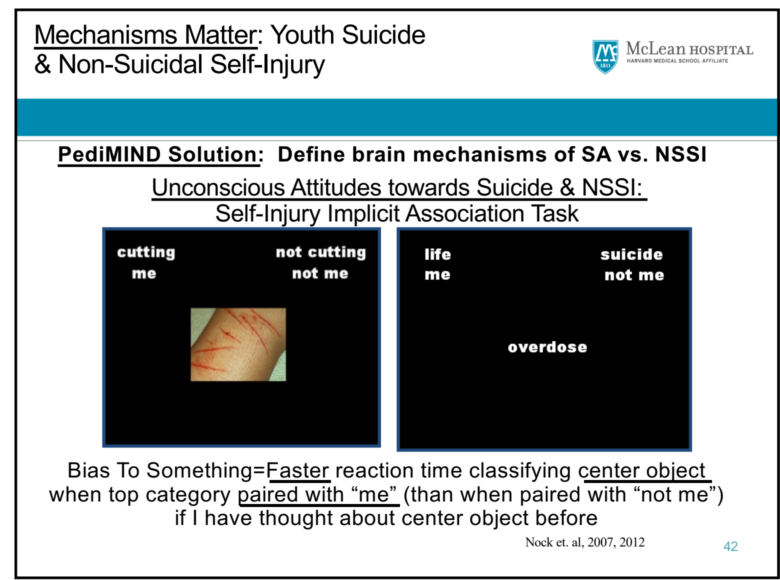

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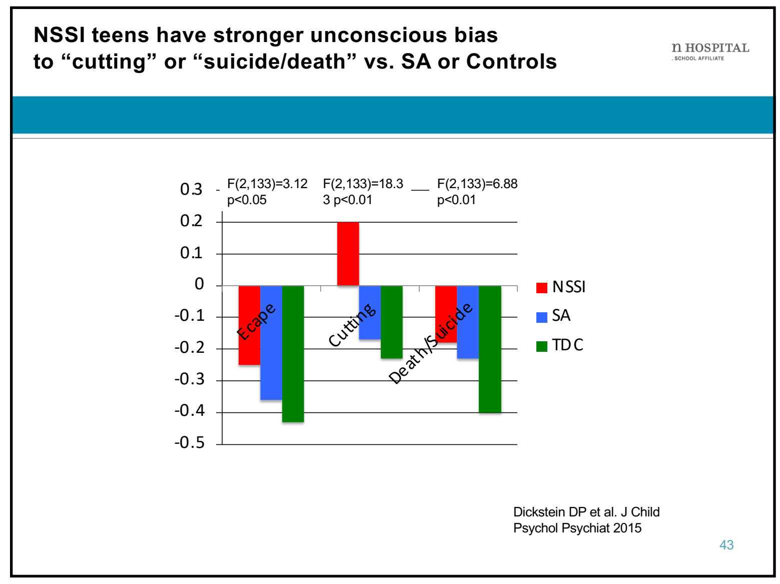

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Summary: NSSI vs. Suicide Attempters

- NSSI is a serious problem associated with
  - Earlier onset of self-harm behavior
  - Greater implicit association with cutting & death/suicide (SI-IAT)
  - Greater self-reported stress during inter-personal collaboration/conflict (Prisoner's Dilemma)
- *Why haven't these NSSI-only youths tried to kill themselves (yet)?*
- *What is the neural mechanism underlying NSSI-only/itself?*
- *What is the mechanism NSSI-only → 1st suicide attempt (vs. continuing with NSSI-only or remitting?*

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R01MH110379 Non-suicidal Self-Injury in Children: Brain Behavior Mechanisms & Risk for Suicidal Behavior

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HARVARD MEDICAL SCHOOL AFFILIATE

10-17 year olds who EITHER cut themselves but have not made a suicide attempt *OR* controls with no mental health problems themselves or their parents

-Detailed multi-informant assessments (interviews, questionnaires, and smart phone app)

-MRI brain scan & special computer games to define mechanisms of peer acceptance/rejection & implicit attitudes about suicide/NSSI

-Brief follow ups at 3, 6, 9, 12, 15, & 18 months

-$680/family

1) *What brain/behavior mechanisms differentiate 11-16yo's engaged in NSSI vs. control youth?*
2) *Which mechanisms predict subsequent 1st-onset suicide attempt (18 months of follow up)?*

PediMIND
Mood, Imaging, & NeuroDevelopment
www.PEDIMIND.org
PEDIMIND@partners.org

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McLean Imaging Center (MIC)

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- 3Tesla Siemens Prisma MRI system
- 64-channel receivers
  - FDA minimal risk
- MRI simulator to desensitize subjects to MRI
- All subjects complete screener pre-enter MRI
- Speakers+microphone so we can talk between scans
- Screen so kids can see our "games"
- Subjects respond by button press

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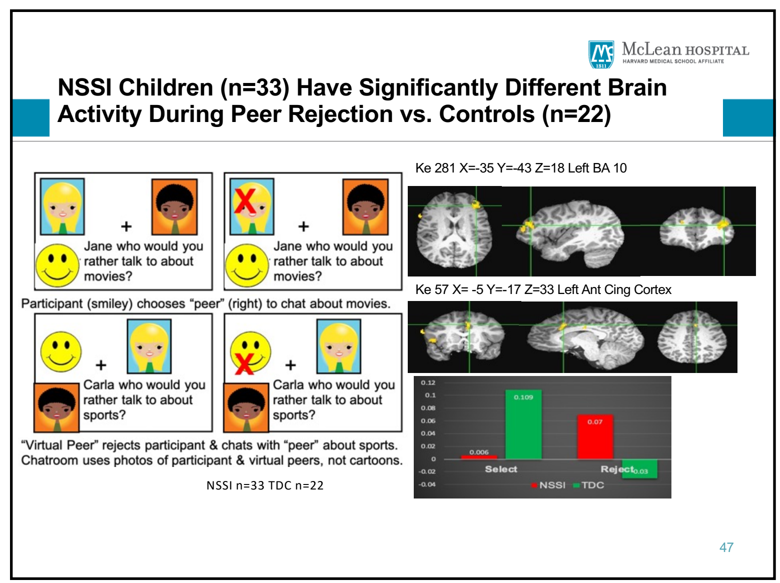

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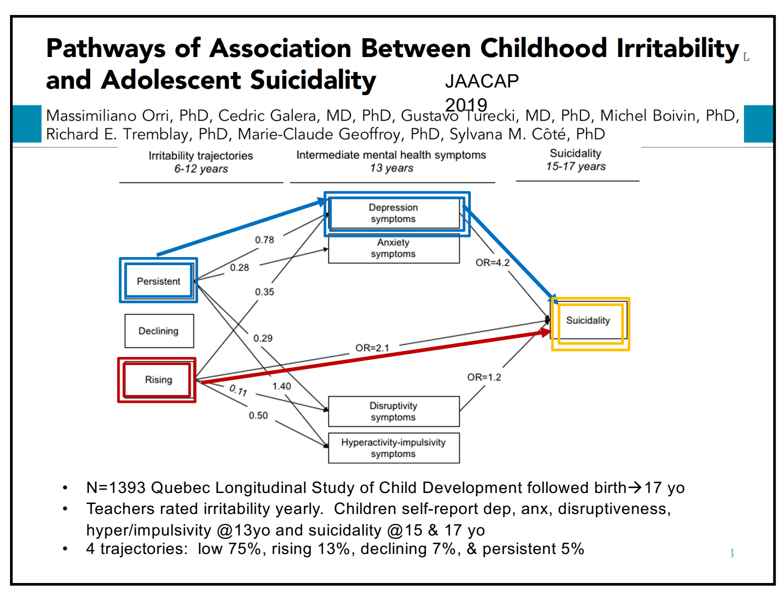

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Charles H. Hood Foundation Major Grant 2020
Brain Mechanisms Underlying Irritability & Suicide

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10-14 year olds who EITHER have attempted suicide OR controls

-Detailed multi-informant assessments (interviews, questionnaires, and smart phone app)

-MRI brain scan & special computer games to define mechanisms of peer acceptance/rejection & implicit attitudes about suicide/NSSI

-Brief follow ups at 3 & 6 months

-$310/family

1) *What are brain/behavior mechanisms underlying youth suicide & irritability?*
2) *Which mechanisms predict repeat suicide attempt?*

www.PEDIMIND.org
PEDIMIND@partners.org

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Summary & Future Directions:

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- Suicide and Non-Suicidal Self-Injury (NSSI) are among our most serious forms of mental illness in children and teens—with no single cause, and no single treatment.
- NSSI=self-injury without intent to die (suggesting that not all NSSI youth need the ER/inpatient care). But, it places children at 7x increased risk of a suicide attempt
- Asking about suicide and NSSI does not cause either behavior.
- NSSI is a growing & serious problem associated with
  - Earlier onset of self-harm behavior
  - Greater implicit association with cutting & death/suicide (SI-IAT)
  - Greater self-reported stress during inter-personal collaboration/conflict (Prisoner's Dilemma)
- Critical role of screening & safety planning b/c never enough ED or inpatient beds
- Together, we can make a powerful difference—just like as has been done in childhood cancer—when providers, families, researchers work together—to conduct mechanism-oriented research….for a precision medicine approach to diagnosis, treatment, prediction, & ultimately prevention—of NSSI & suicide.

1-877-626-8140

https://www.mcleanhospital.org/treatment/youth-programs

PediMIND
Mood, Imaging, & NeuroDevelopment
www.PEDIMIND.org
PEDIMIND@partners.org

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