

Brain/Behavior Alterations Underlying Self-Injury & Suicide Among Children & Adolescents

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PediMIND



Mood, Imaging, & NeuroDevelopment

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
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R21/33MH095850, K22MH074945
- **No industry support**



PSYCHIATRIC DISORDERS & SYMPTOMS

BEHAVIOR



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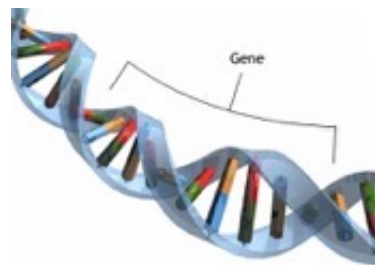


BRAIN

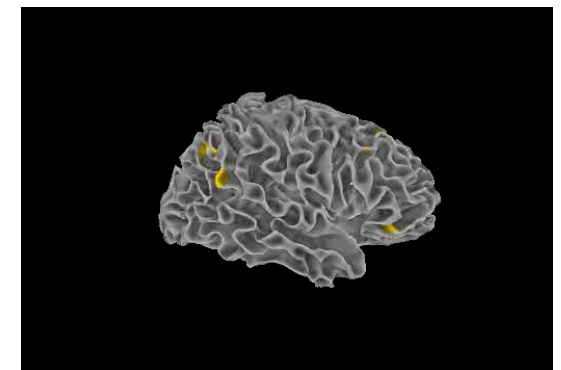
Goal: Identify brain/behavior mechanisms of child psychiatric disorders

**More Accurate & Effective
Diagnosis & Treatment**

GENES



#ADAM



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) To report data from a study of teens engaged in NSSI and suicide
- (3) What can be done to address youth suicide now?
How can better understanding of brain/behavior mechanisms of NSSI be translated into better care in the future?

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
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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.



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.

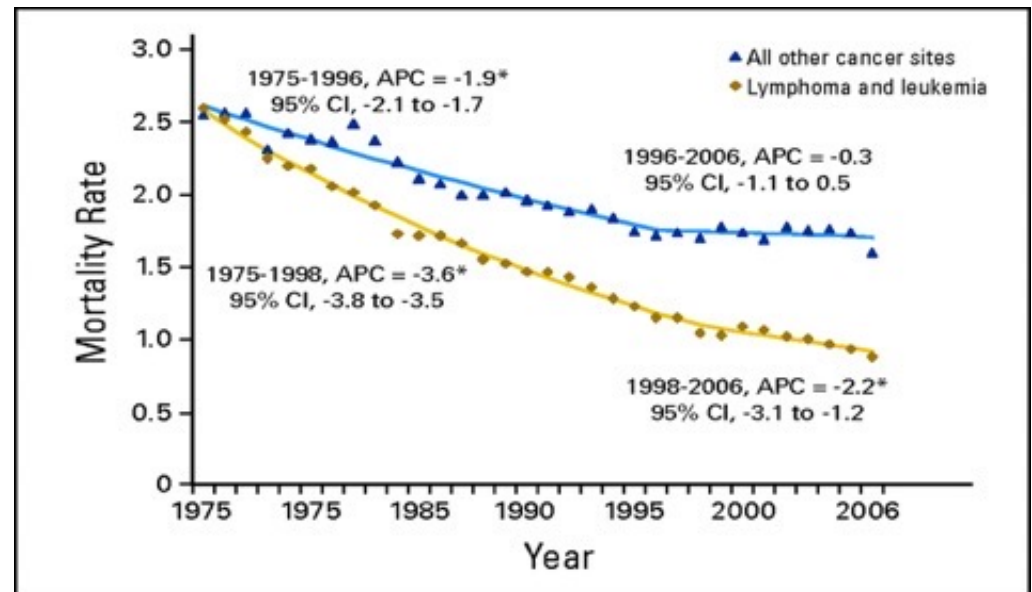
How is it possible that so many of our young people are suffering from depression and killing themselves when we know perfectly well how to treat this illness? If thousands of teens were dying from a new infectious disease or a heart ailment, there would be a public outcry and a national call to action.

Mechanisms Matter: A tale of 2 children...

Jack 5yo fatigue, fever, joint pain, swollen belly, bruising

- Exam:
hepatosplenomegaly, pale
- CBC: WBC 3.7 (32% neut 10% blast), Hgb 9.8 PLT 172
- Symptoms + bio-marker
=specific early diagnosis
=mechanism-targeted
treatment
- =better prognosis/outcome

US childhood (<20yo) mortality trends for lymphoma and leukemia, & Other Cancers



APC=Annual Percent Change

Smith M A et al. J Clinical Oncology 2010;28:2625-2634

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?

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

Rank	Age Groups										Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	
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

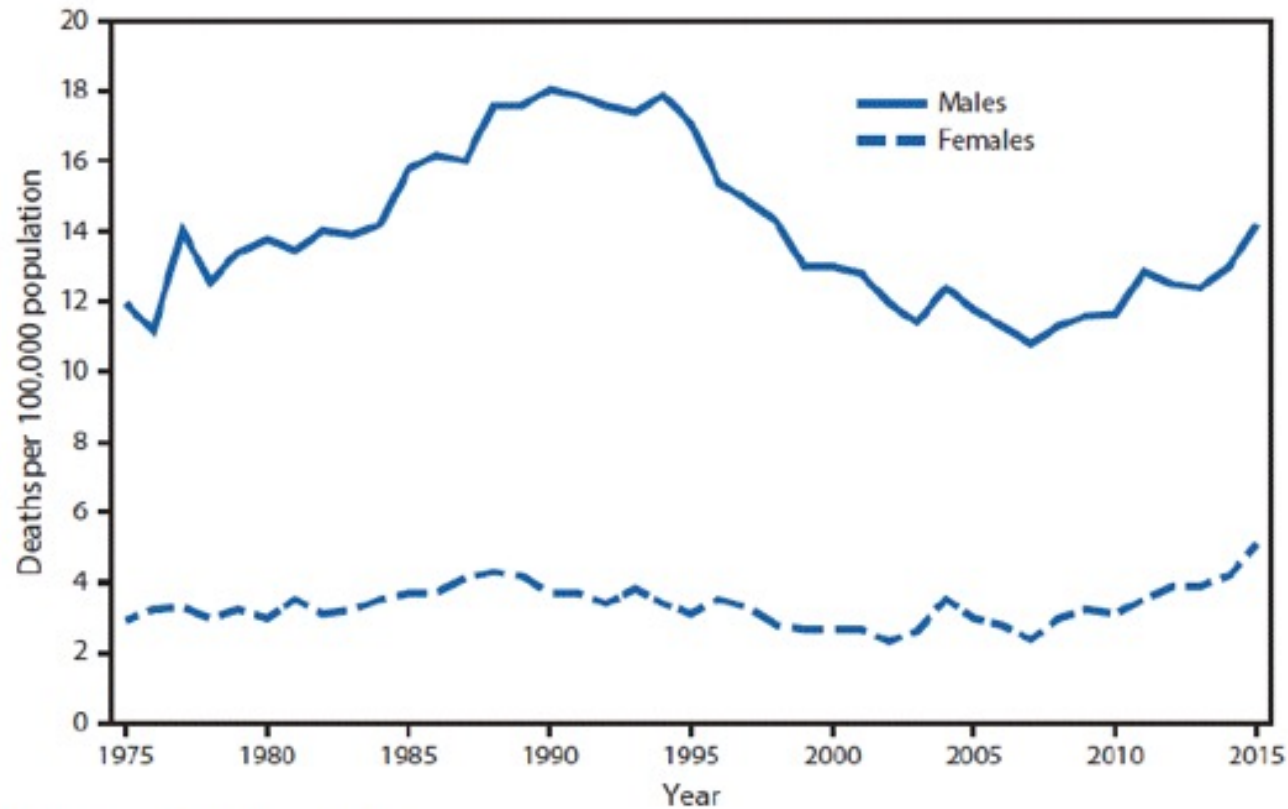
Data Source: NCHADS
Produced by: NCHADS

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



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

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



* Rates are per 100,000 population.

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)

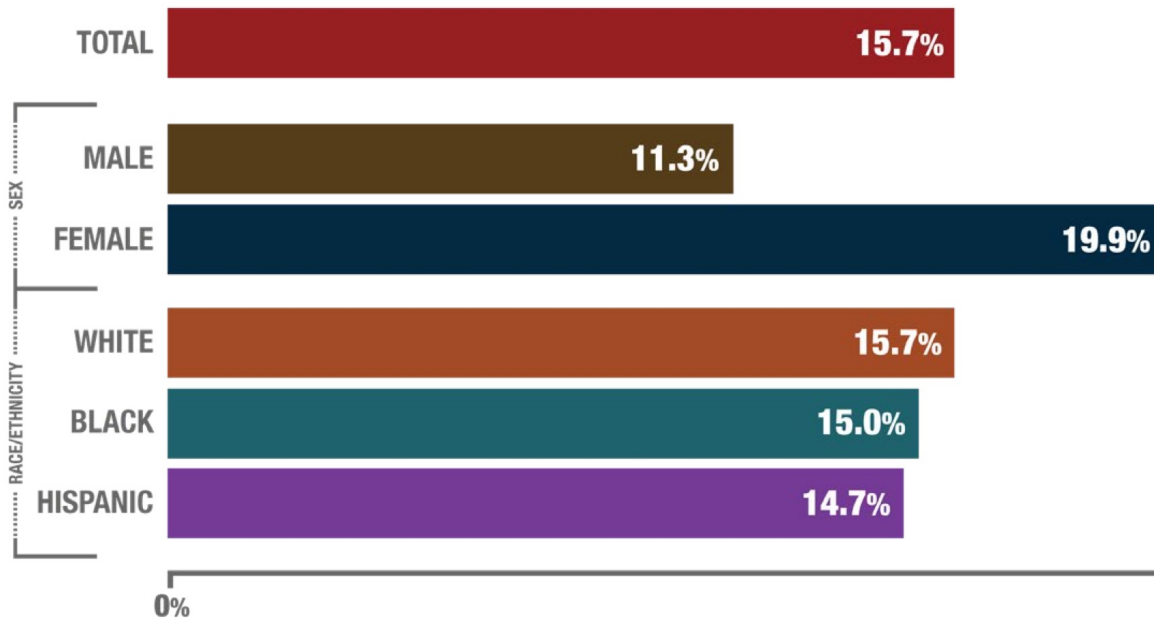


CDC Youth Risk Behavior Surveillance (YRBS) 2019

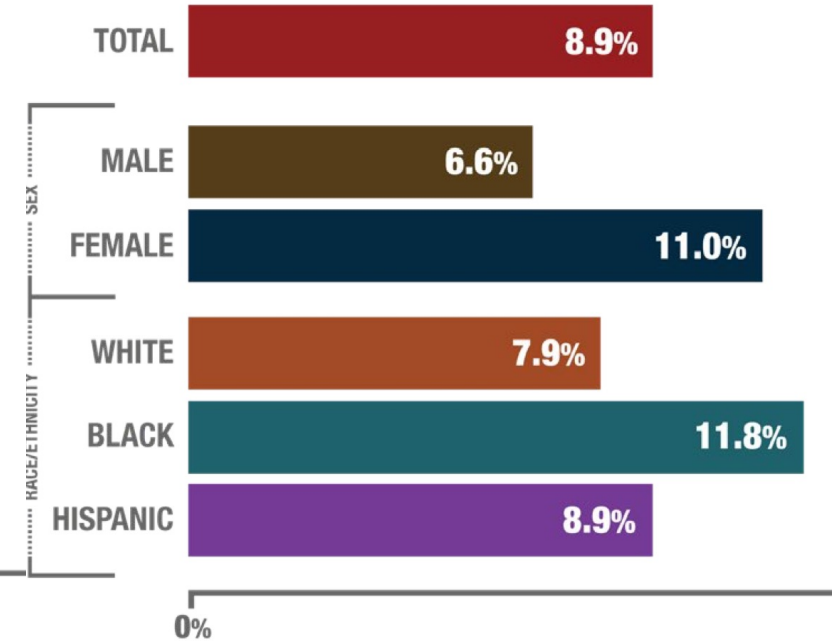
Shows High Rates of Suicidality Among High School (HS) Students



Percent of HS Students Who Made a Suicide Plan During Past Year



Percent of HS Students Who Made a Suicide Attempt During Past Year

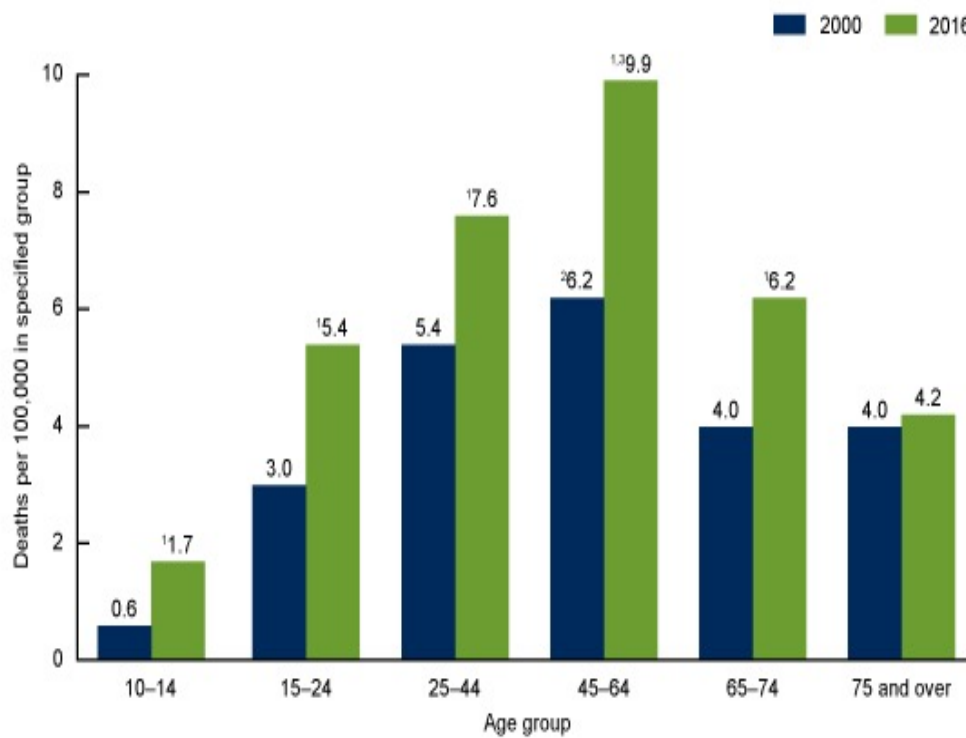


Increase in completed suicide 2000-2016 by age

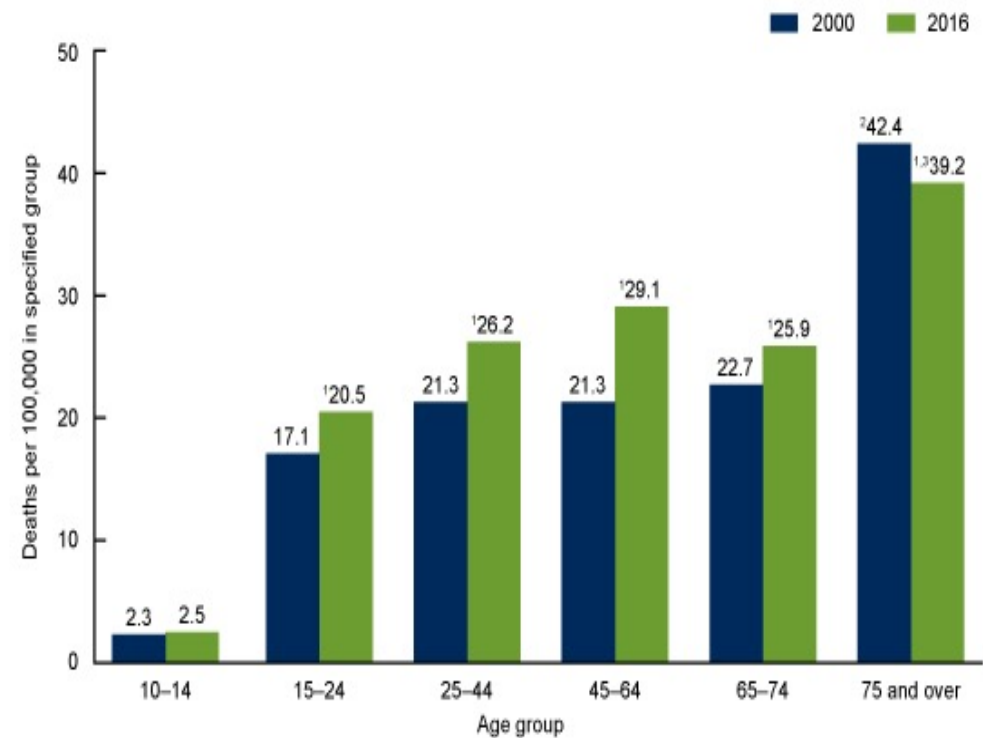
Source: CDC 06/2018



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Females



Males

Suicide rates ↑30% >50% of US States since 1999

>54% who died by suicide had NO known mental health disorder

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



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

Mechanisms Matter: Youth Suicide & Non-Suicidal Self-Injury

A 19-YEAR-OLD DIES BY SUICIDE ONE YEAR AFTER SURVIVING THE PARKLAND SCHOOL SHOOTING *March 22, 2019*

Sydney Aiello, a survivor of the school shooting in Parkland, Fla., killed herself last weekend, according to family members and friends cited in news reports.

Aiello, 19, was a senior at Marjory Stoneman Douglas High School last year when a gunman killed 17 students and school staff.

“Cara said Sydney struggled to attend college classes because she was afraid of being in a classroom and was often sad recently but never asked for help before she killed herself.”

A Prioritized Research Agenda for Suicide Prevention:

An Action Plan to Save Lives

Research Prioritization Task Force

www.suicide-research-agenda.org



The Public-Private Partnership Advancing the National Strategy for Suicide Prevention



- Reduce suicide attempts & suicide completions by 20% in 5 yrs & >40% in 10 yrs
 - 1) Why do people become suicidal?
 - 2) How can we better detect/predict risk?
 - 3) What interventions or preventions are effective?
 - 4) What services are most effective for treating suicidal behavior?
 - 5) What non-health care centered preventions/interventions work?
 - 6) What new & existing research infrastructure is needed to reduce suicidal behavior?

NSSI: Non-Suicidal Self-Injury

“deliberate destruction of one’s body in without intent to die”

- Self-cutting, also erasing, scratching, burning
- Arms, thighs, stomach
- “Suicidal gesture”: outdated term
- Not clear that there are sex differences
- No SES or ethno-racial differences
- Growing problem:
 - 13-25% of adolescents (Rodham 2009)
 - 25% 7-24yo seen in ED for self-harm (Olfson 2005)
 - 4.3% (1990)→13.2% (2000) teens hospitalized for self-harm engaged in NSSI (Olfson 2005)



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 \uparrow 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



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) To report data from a study of teens engaged in NSSI and suicide
- (3) What can be done to address youth suicide now?
How can better understanding of brain/behavior mechanisms of NSSI be translated into better care in the future?

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



Photo: ST, Lim Sin Thea

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



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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 or 1st degree relatives
- IQ >70; English fluency in the teenage participant

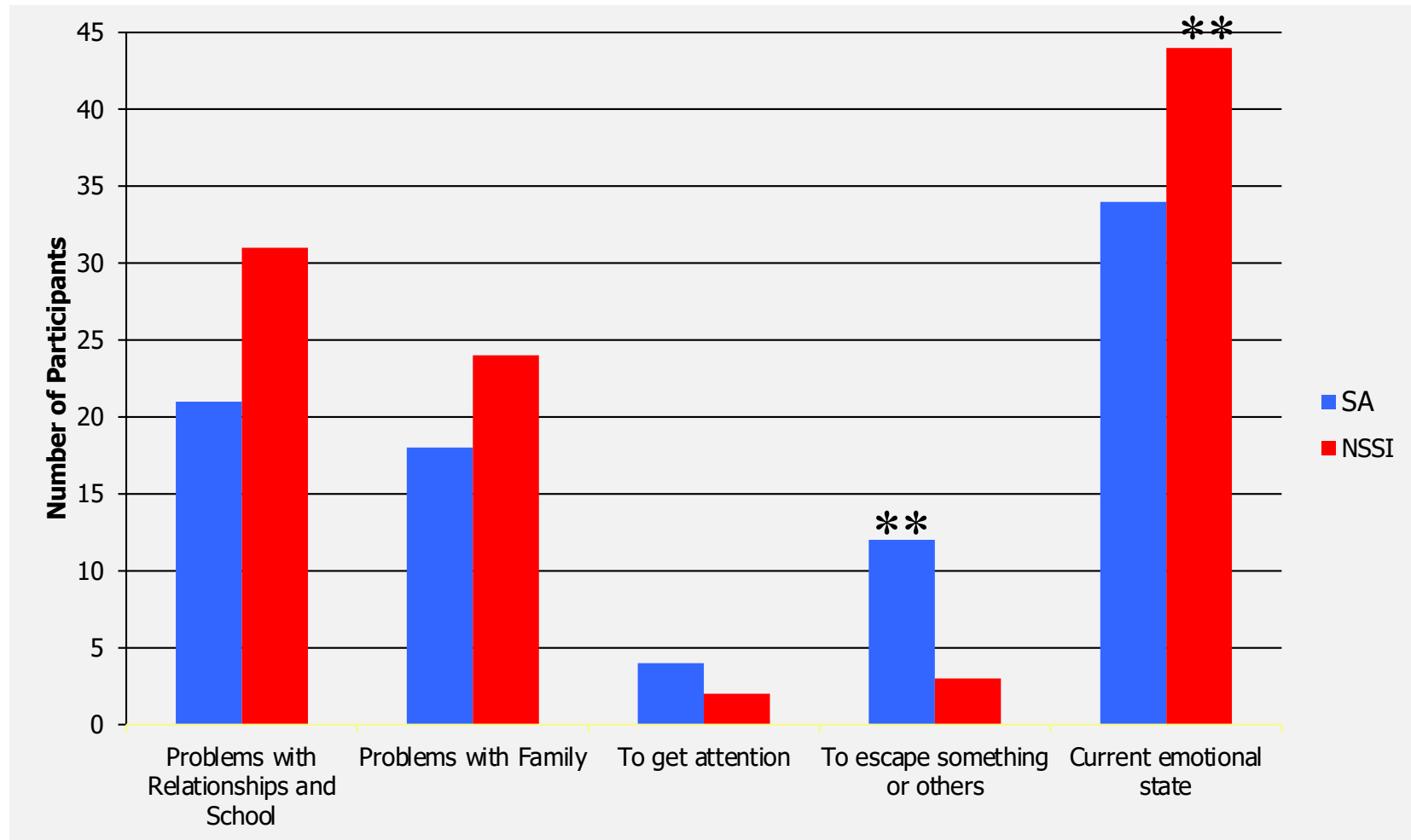
Outcomes:

- Psychopathology/demographics
- Behavioral task performance

Sample Demographics

	NSSI (n=45)	SA (n=45)	
<i>Age in Years (SD)</i>	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%)	$\chi^2=5.68, p=0.02$
<i>SI Onset</i>	12.4 y/o	13.8 y/o	$p < 0.01$
<i>Onset of Self-Injurious Behavior (NSSI or SA)</i>	13.2±1.8	14.8±1.4	$F(1,84)=15.40 p<0.01$
<i>BSS Current SI</i>	13.21±8.07	10.68±7.91	$F(1,85)=2.17 p=0.14$
<i>Medications</i> None SSRI Sedatives	6 (13) 34 (76) 4 (9)	17 (38)** 23 (51)* 0 (0)*	$*p < .05; **p < .01$

Reason for Engaging in Self-Harm



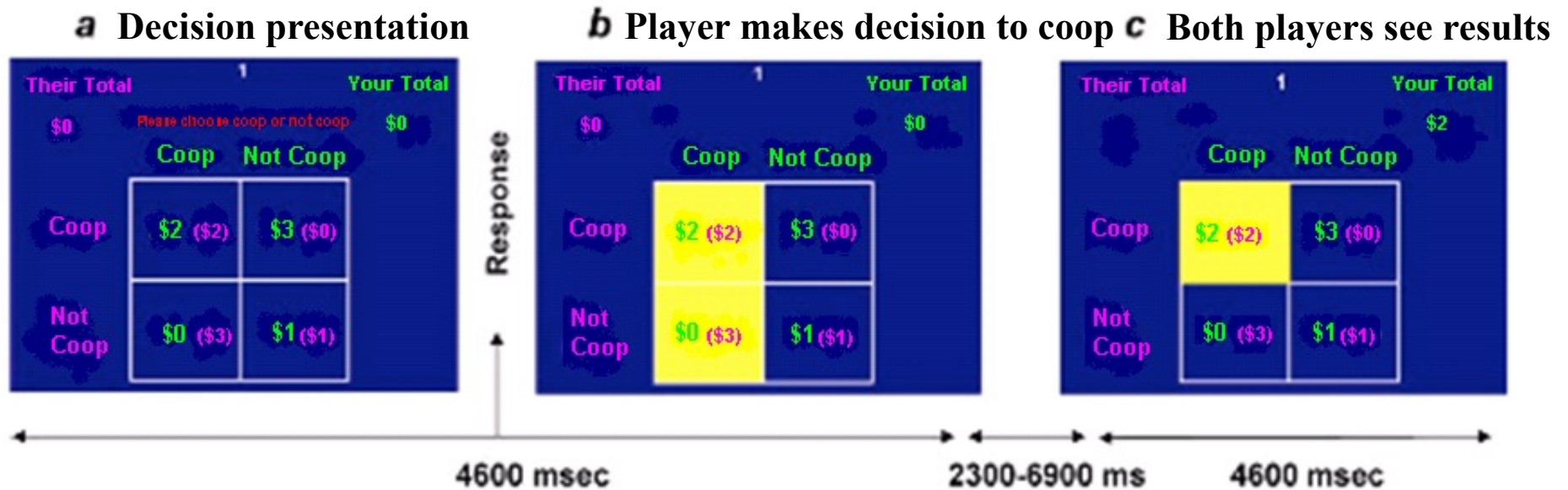
** $p < .01$

Prisoner's Dilemma Task: Peer Acceptance & Rejection



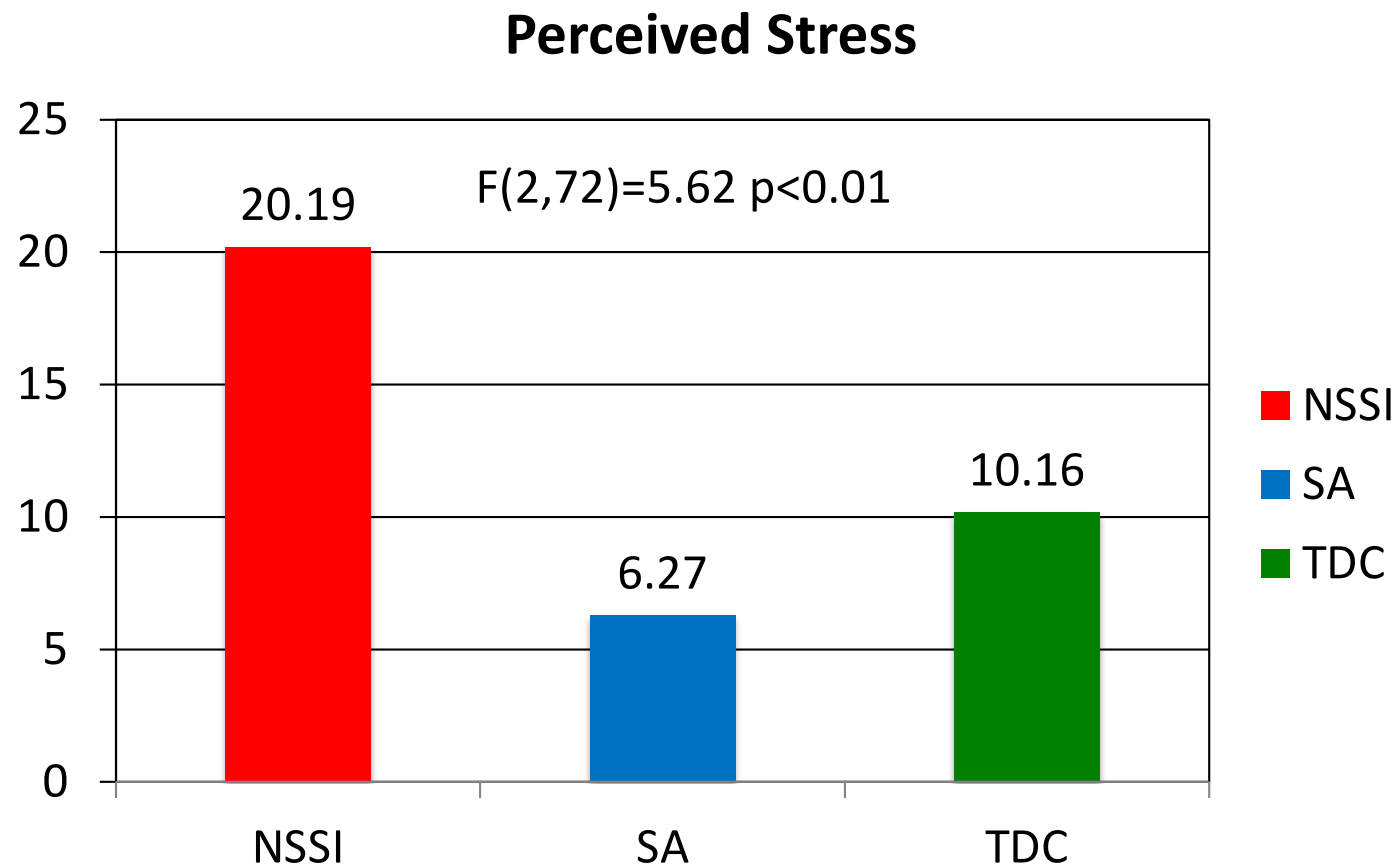
- Simulates social situations using reciprocal economic exchange
- (In English): Players win money depending on whether they and the other player decide to cooperate or not cooperate (“defect”)
- Each player’s decision is revealed after every round
- Allows examination of players’:
 - (a) Play (do they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

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

PD: Stress During Peer Acceptance/Rejection

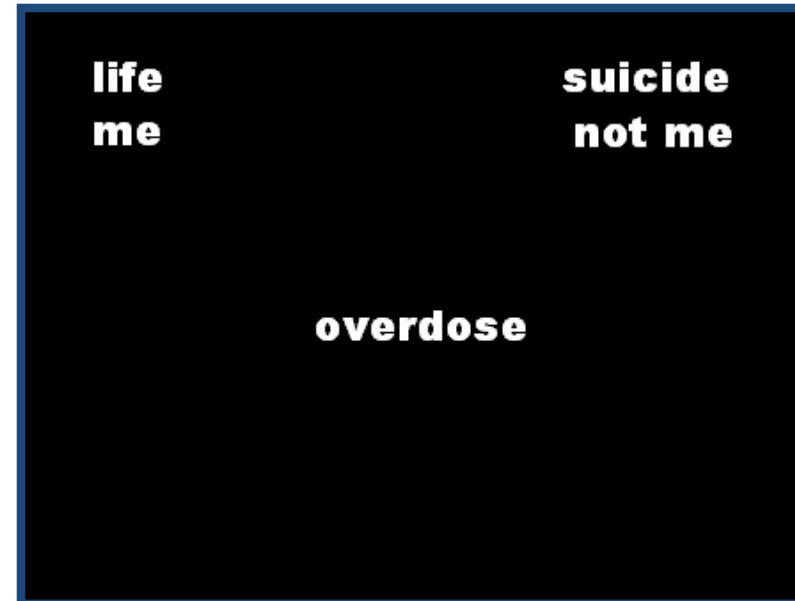


Mechanisms Matter: Youth Suicide & Non-Suicidal Self-Injury

PediMIND Solution: Define brain mechanisms of SA vs. NSSI

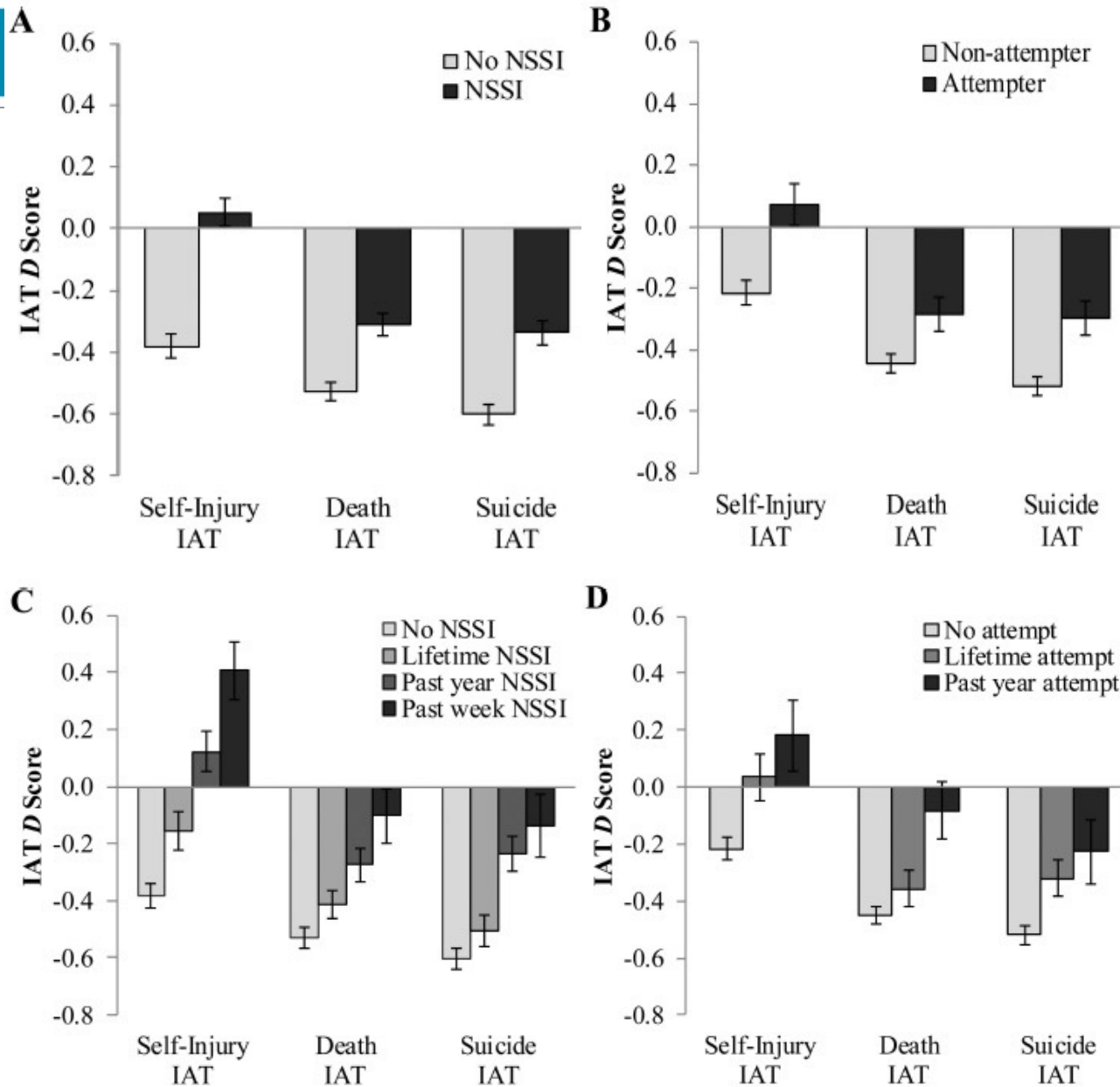
Unconscious Attitudes towards Suicide & NSSI:

Self-Injury Implicit Association Task



Bias To Something=Faster reaction time classifying center object when top category paired with "me" (than when paired with "not me") if I have thought about center object before

Implicit Associations in 7,015 Adults Robustly Map onto Self-Harm

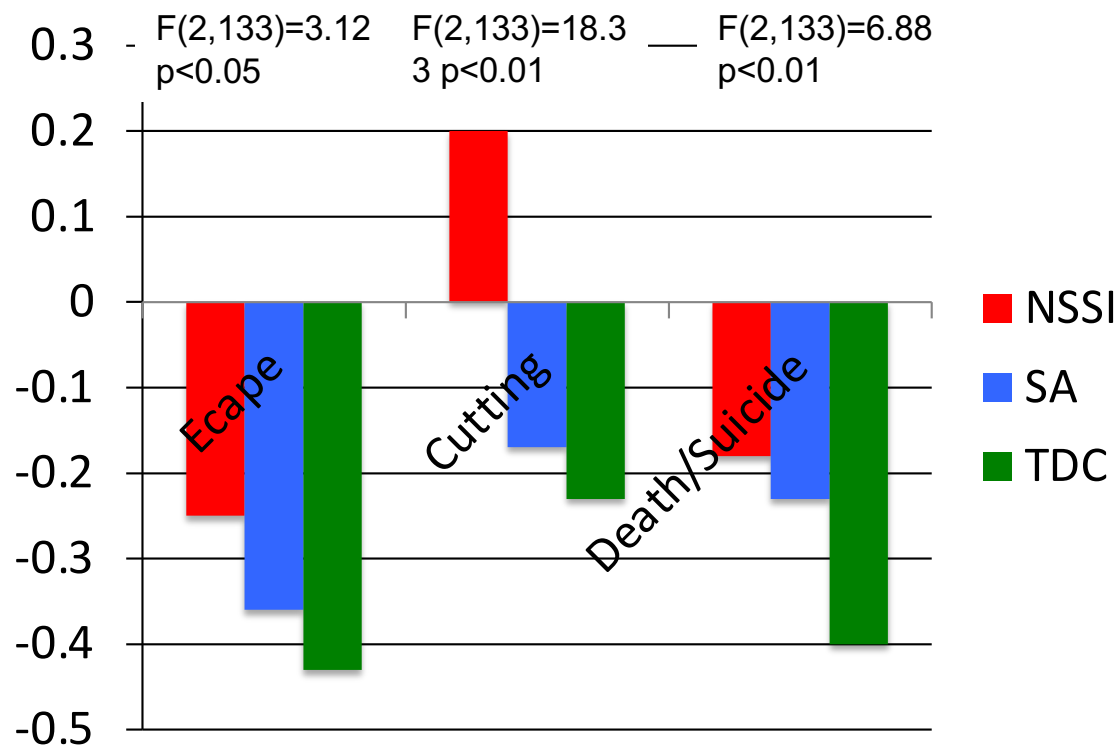


N=7,015 adults completing >1 IAT via ImplicitMentalHealth.com

- N=2,332 self-injury
- N=2,298 death
- N=2,385 suicide

Glenn JJ J Abn Psych 2017

NSSI teens have stronger unconscious bias to “cutting” or “suicide/death” vs. SA or Controls



Dickstein DP et al. J Child Psychol Psychiat 2015

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)?*

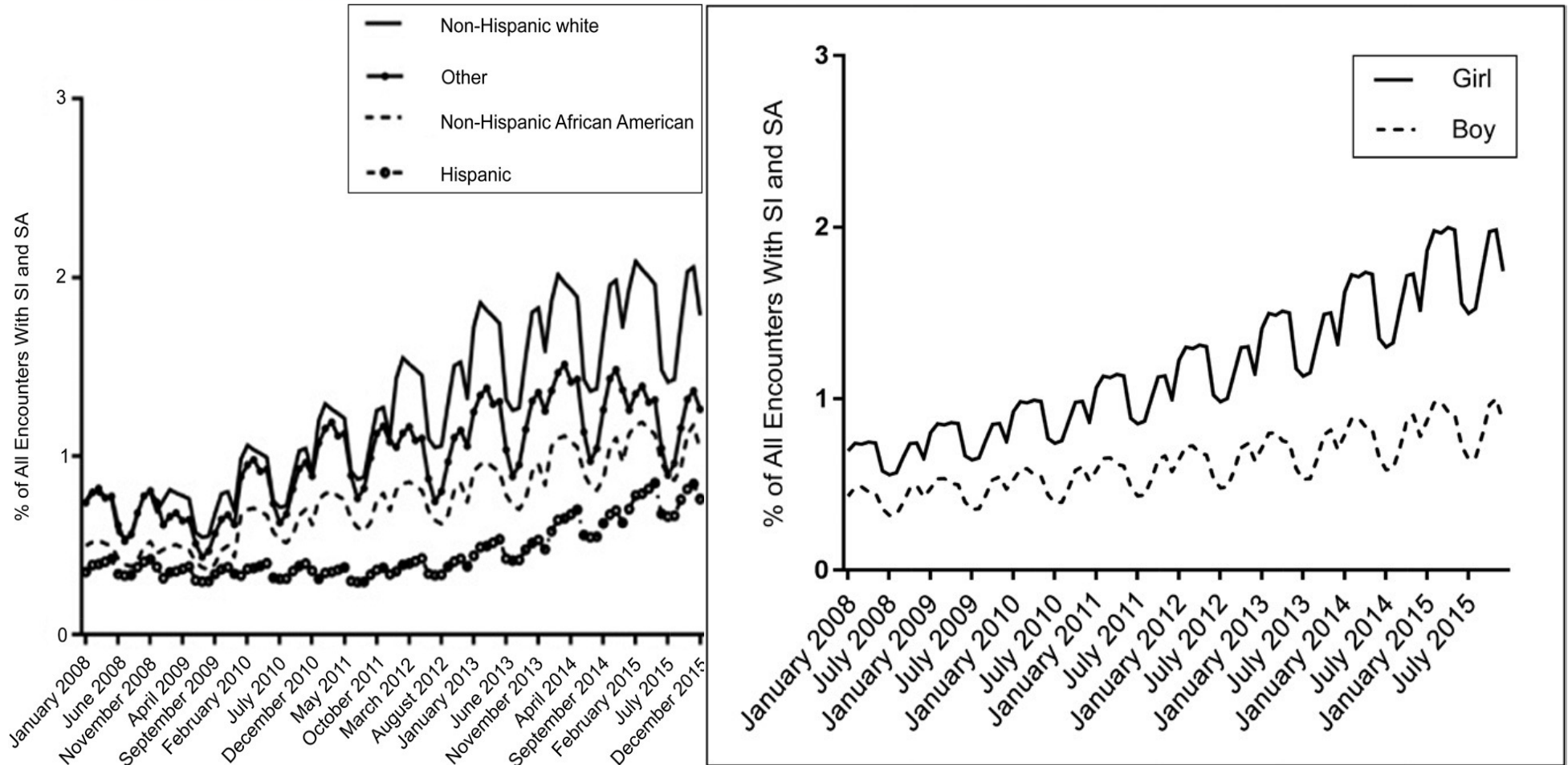
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Hospitalization for Suicide Ideation or Attempt: 2008–2015

Pediatrics 2018

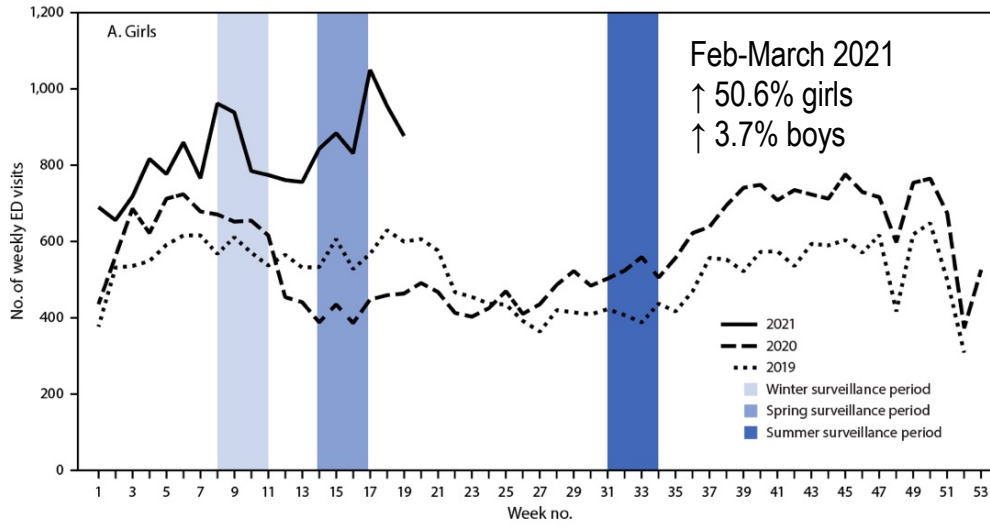
Gregory Plemmons, MD,^a Matthew Hall, PhD,^b Stephanie Douplik, MD,^c James Gay, MD, MMHC,^a
Charlotte Brown, MD,^a Whitney Browning, MD,^a Robert Casey, MD,^a Katherine Freundlich, MD,^a
David P. Johnson, MD,^a Carrie Lind, MD,^a Kris Rehm, MD,^a Susan Thomas, MD,^a Derek Williams, MD, MPH^a



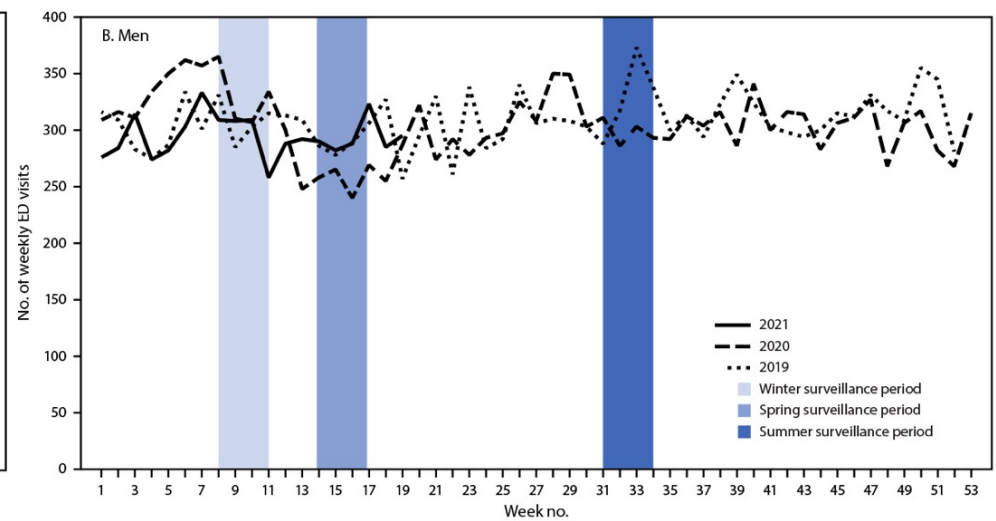
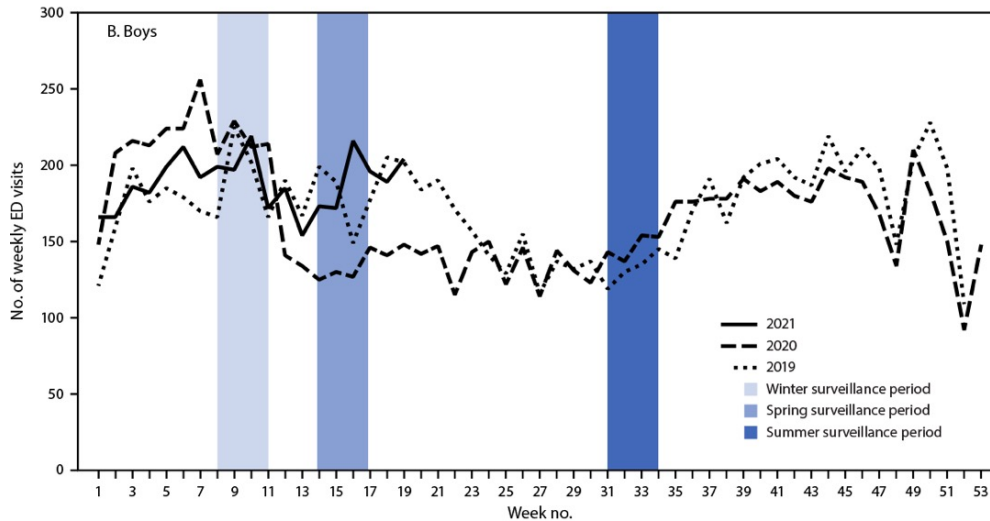
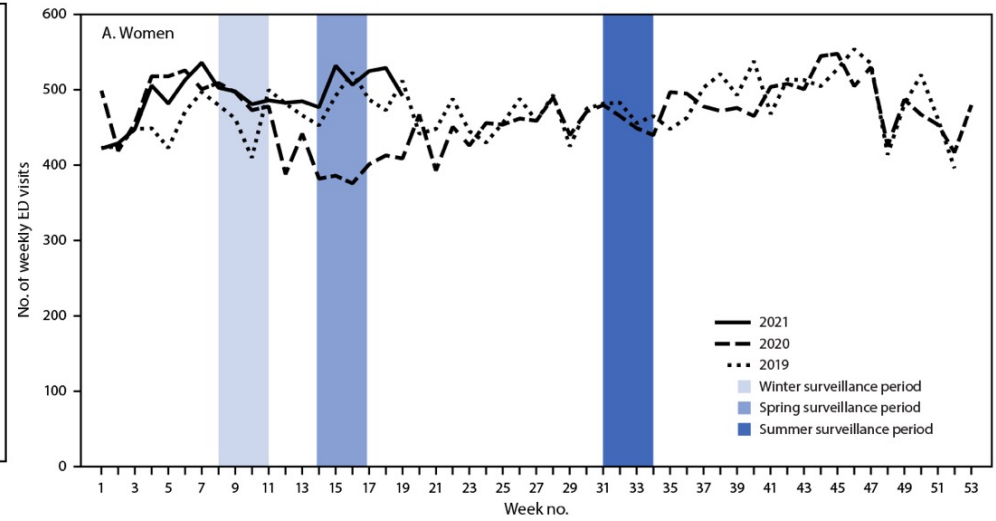
COVID Does Not Universally Increase ED Visits For Suicide (Yard E. MMWR 2021)



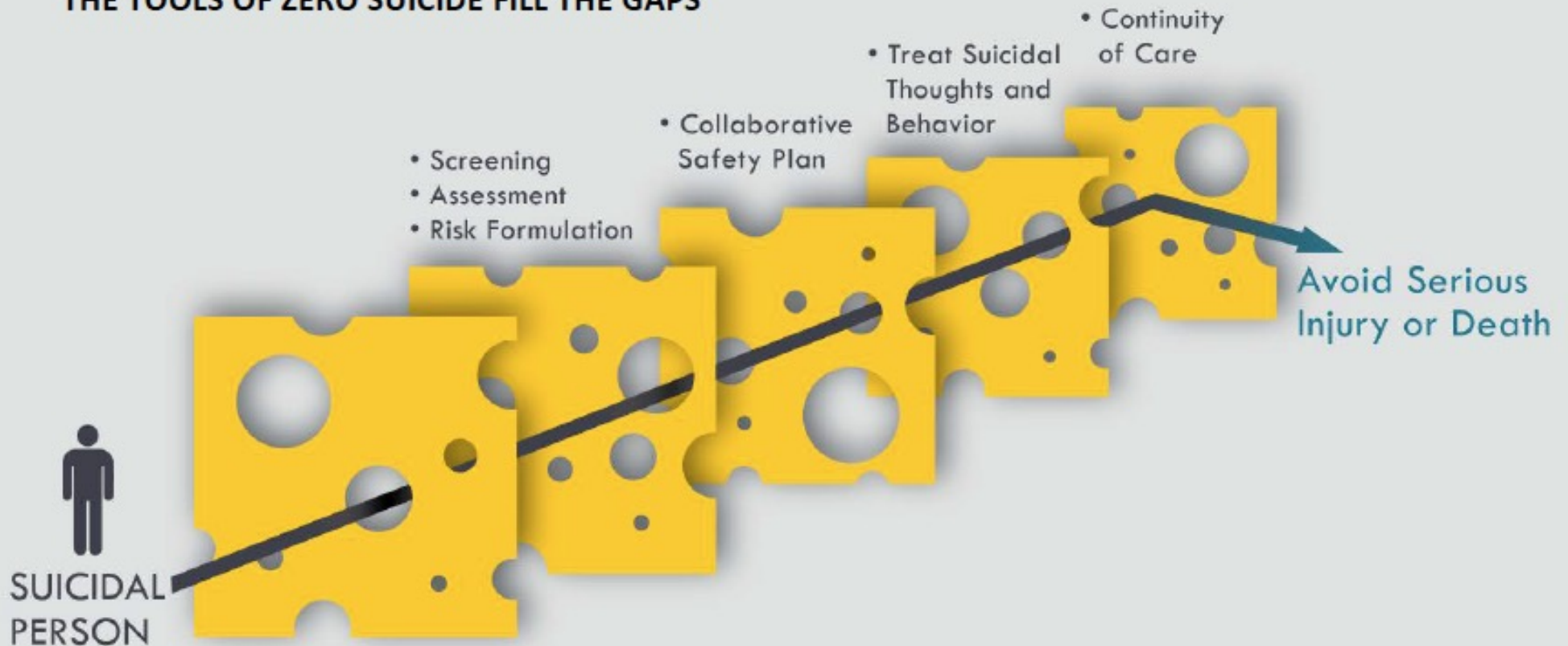
ED Visits Children 12-17



ED Visits Adults 18-25



THE TOOLS OF ZERO SUICIDE FILL THE GAPS



Adapted from James Reason's "Swiss Cheese" Model Of Accidents

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	<ul style="list-style-type: none"> • Mental illness • Substance use disorder • Previous suicide attempt • Impulsivity/aggressiveness 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • High conflict or violent relationships (including bullying) • Family history of suicide • Lack of positive peer, family or other relationships with adults 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.) 	<ul style="list-style-type: none"> • Safe and supportive school and community environments • Access to continued best practice care after inpatient or psychiatric hospitalizations and emergent/urgent care
Societal	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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

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.



Suicide Risk Screening Tool

Ask *Suicide-Screening* Questions

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: _____

NIMH Suicide Screening Tools

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



Brief Suicide Safety Assessment

Ask Suicide-Screening Questions

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

- Use after a patient (10 - 24 years) screens positive for suicide risk on the asQ
- Assessment guide for mental health clinicians, MDs, NPs, or PAs
- Prompts help determine disposition

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 *If possible, assess patient alone (depending on developmental considerations and parent willingness)*

Review patient's responses from the asQ

Frequency of suicidal thoughts

Determine if and how often the patient is having suicidal thoughts. **Ask the patient:** "In the past few weeks, have you been thinking about killing yourself?" **If yes, ask:** "How often?" (once or twice a day, several times a day, a couple times a week, etc.)

"Are you having thoughts of killing yourself right now?" (If "yes," patient requires an urgent/STAT mental health evaluation and cannot be left alone. A positive response indicates imminent risk.)

Suicide plan

Assess if the patient has a suicide plan, regardless of how they responded to any other questions (ask about method and access to means). **Ask the patient:** "Do you have a plan to kill yourself? Please describe." **If no plan, ask:** "If you were going to kill yourself, how would you do it?"

Note: If the patient has a very detailed plan, this is more concerning than if they haven't thought it through in great detail. If the plan is feasible (e.g., if they are planning to use pills and have access to pills), this is a reason for greater concern and removing or securing dangerous items (medications, guns, ropes, etc.).

Past behavior *(Strongest predictor of future attempts)*

Evaluate past self-injury and history of suicide attempts (method, estimated date, intent). **Ask the patient:** "Have you ever tried to hurt yourself?" "Have you ever tried to kill yourself?" **If yes, ask:** "How? When? Why?" and assess intent: "Did you think [method] would kill you?" "Did you want to die?" (for youth, intent is as important as lethality of method) **Ask:** "Did you receive medical/psychiatric treatment?"

Symptoms

Depression: "In the past few weeks, have you felt so sad or depressed that it makes it hard to do the things you would like to do?"

Anxiety: "In the past few weeks, have you felt so worried that it makes it hard to do the things you would like to do or that you feel constantly agitated/on-edge?"

Impulsivity/Recklessness: "Do you often act without thinking?"

Hopelessness: "In the past few weeks, have you felt hopeless, like things would never get better?"

Irritability: "In the past few weeks, have you been feeling more irritable or grouchier than usual?"

Substance and alcohol use: "In the past few weeks, have you used drugs or alcohol?" **If yes, ask:** "What? How much?"

Other concerns: "Recently, have there been any concerning changes in how you are thinking or feeling?"

Support & Safety

Support network: "Is there a trusted adult you can talk to? Who? Have you ever seen a therapist/counselor?" **If yes, ask:** "When?"

Safety question: "Do you think you need help to keep yourself safe?" (A "no" response does not indicate that the patient is safe, but a "yes" is a reason to act immediately to ensure safety.)

Reasons for living: "What are some of the reasons you would NOT kill yourself?"

3 Interview *patient and parent/guardian together*

*If patient is ≥ 18, ask patient's permission for parent to join.

Say to the parent: "After speaking with your child, I have some concerns about his/her safety. We are glad your child spoke up as this can be a difficult topic to talk about. We would now like to get your perspective."

- "Your child said (reference positive responses on the asQ). Is this something he/she shared with you?"
- "Does your child have a history of suicidal thoughts or behaviors that you're aware of?" **If yes, say:** "Please explain."
- "Does your child seem sad or depressed? Withdrawn? Anxious? Impulsive? Hopeless? Irritable? Reckless?"
- "Are you comfortable keeping your child safe at home?"
- "How will you secure or remove potentially dangerous items (guns, medications, ropes, etc.)?"
- "Is there anything you would like to tell me in private?"

4 Determine disposition

After completing the assessment, choose the appropriate disposition.

- Emergency psychiatric evaluation:** Patient is at imminent risk for suicide (current suicidal thoughts). Urgent/STAT page psychiatry; keep patient safe in ED
- Further evaluation of risk is necessary:** Request full mental health/safety evaluation in the ED
- No further evaluation in the ED:** Create safety plan for managing potential future suicidal thoughts and discuss securing or removing potentially dangerous items (medications, guns, ropes, etc.)
 - Send home with mental health referral or
 - No further intervention is necessary at this time

5 Provide resources to all patients

- 24/7 National Suicide Prevention Lifeline: 1-800-273-TALK (8255), En Español: 1-888-628-9454
- 24/7 Crisis Text Line: Text "HOME" to 741-741

Parent-Adolescent Agreement About Adolescents' Suicidal Thoughts

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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 ($\kappa = 0.466$) and low for thoughts of death or dying ($\kappa = 0.171$). 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.

Suicide Prevention in an Emergency Department Population The ED-SAFE Study

Ivan W. Miller, PhD; Carlos A. Camargo Jr, MD, DrPH; Sarah A. Arias, PhD; Ashley F. Sullivan, MS, MPH; Michael H. Allen, MD; Amy B. Goldstein, PhD; Anne P. Manton, PhD, APRN; Janice A. Espinola, MPH; Richard Jones, ScD; Kohei Hasegawa, MD, MPH; Edwin D. Boudreaux, PhD; for the ED-SAFE Investigators

IMPORTANCE Suicide is a leading cause of deaths in the United States. Although the emergency department (ED) is an opportune setting for initiating suicide prevention efforts, ED-initiated suicide prevention interventions remain underdeveloped.

OBJECTIVE To determine whether an ED-initiated intervention reduces subsequent suicidal behavior.

DESIGN, SETTING, AND PARTICIPANTS This multicenter study of 8 EDs in the United States enrolled adults with a recent suicide attempt or ideation and was composed of 3 sequential phases: (1) a treatment as usual (TAU) phase from August 2010 to December 2011, (2) a universal screening (screening) phase from September 2011 to December 2012, and (3) a universal screening plus intervention (intervention) phase from July 2012 to November 2013.

INTERVENTIONS Screening consisted of universal suicide risk screening. The intervention phase consisted of universal screening plus an intervention, which included secondary suicide risk screening by the ED physician, discharge resources, and post-ED telephone calls focused on reducing suicide risk.

MAIN OUTCOMES AND MEASURES The primary outcome was suicide attempts (nonfatal and fatal) over the 52-week follow-up period. The proportion and total number of attempts were analyzed.

RESULTS A total of 1376 participants were recruited, including 769 females (55.9%) with a median (interquartile range) age of 37 (26-47) years. A total of 288 participants (20.9%) made at least 1 suicide attempt, and there were 548 total suicide attempts among participants. There were no significant differences in risk reduction between the TAU and screening phases (23% vs 22%, respectively). However, compared with the TAU phase, patients in the intervention phase showed a 5% absolute reduction in suicide attempt risk (23% vs 18%), with a relative risk reduction of 20%. Participants in the intervention phase had 30% fewer total suicide attempts than participants in the TAU phase. Negative binomial regression analysis indicated that the participants in the intervention phase had significantly fewer total suicide attempts than participants in the TAU phase (incidence rate ratio, 0.72; 95% CI, 0.52-1.00; $P = .05$) but no differences between the TAU and screening phases (incidence rate ratio, 1.00; 95% CI, 0.71-1.41; $P = .99$).

CONCLUSIONS AND RELEVANCE Among at-risk patients in the ED, a combination of brief interventions administered both during and after the ED visit decreased post-ED suicidal behavior.

What can we do NOW? Make a safety plan

JAMA Psychiatry | [Original Investigation](#)

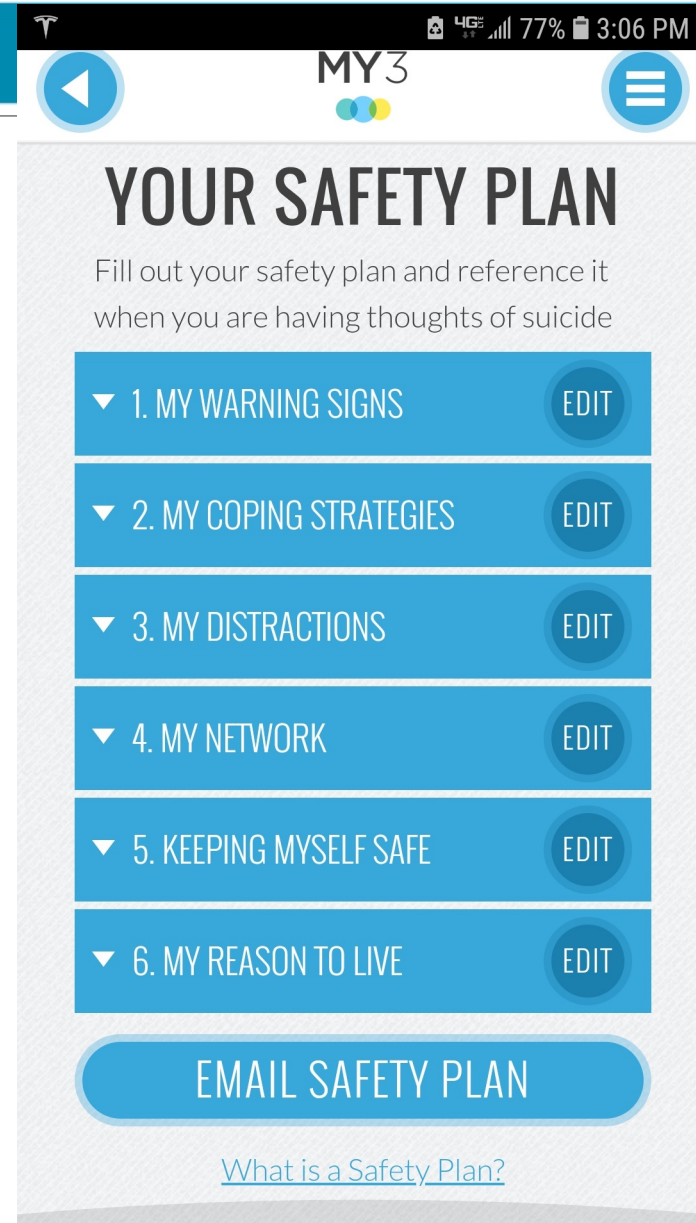
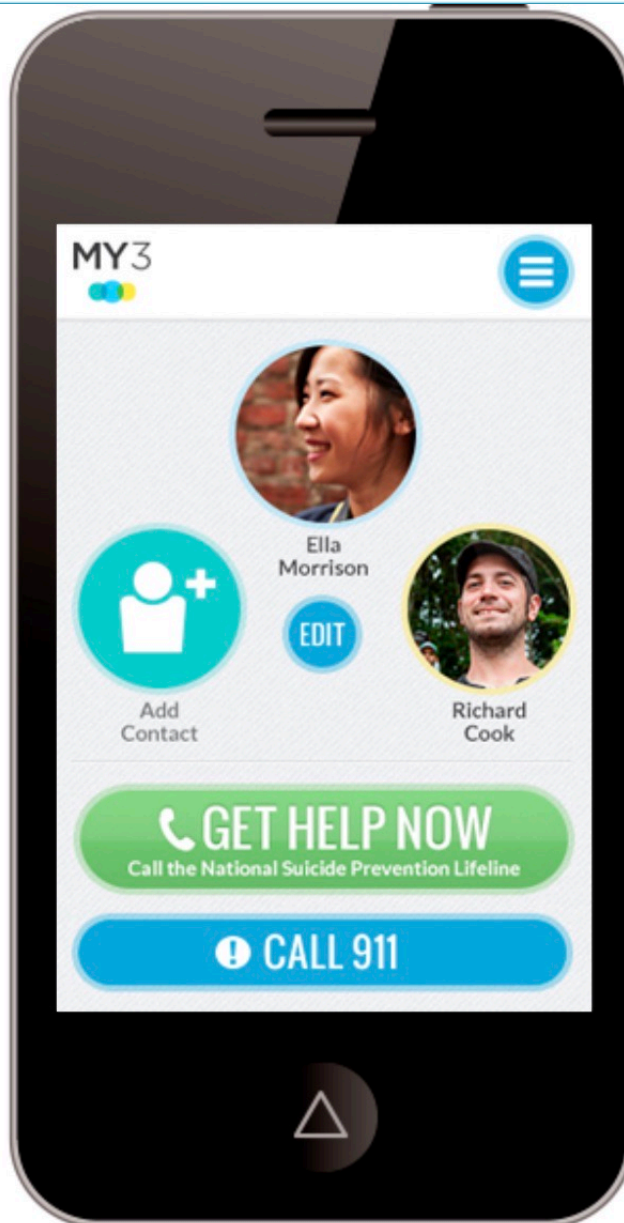
Comparison of the Safety Planning Intervention With Follow-up vs Usual Care of Suicidal Patients Treated in the Emergency Department

JAMA Psychiatry 2018

Barbara Stanley, PhD; Gregory K. Brown, PhD; Lisa A. Brenner, PhD; Hanga C. Galfalvy, PhD; Glenn W. Currier, MD; Kerry L. Knox, PhD; Sadia R. Chaudhury, PhD; Ashley L. Bush, MMA; Kelly L. Green, PhD

- Adults in 9 Eds 2010-2015 n=1640 pts
- Safety plan=prioritized list of coping strategies & skills vs. Tx As Usual (TAU)
- Safety plan group=
 - ↓suicidal behavior (3.03% vs. 5.29% TAU--> 45% fewer suicidal behaviors during 6 month follow up)
 - Double rate of keeping at least 1 outpatient follow up (OR 2.06)

Make a Safety Plan:



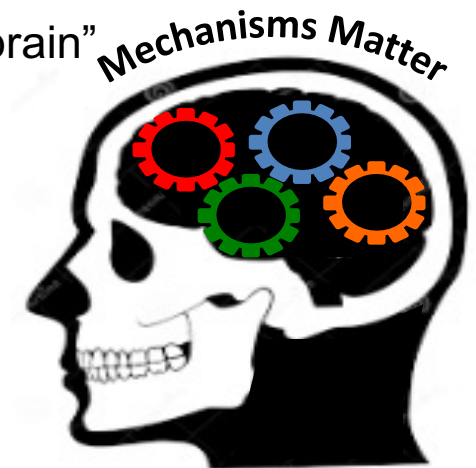
What can we do NOW?

PediMIND Program Research (www.PEDIMIND.org)



McLean HOSPITAL
HARVARD MEDICAL SCHOOL AFFILIATE

- 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, community organizations, & funders.



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

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)?*

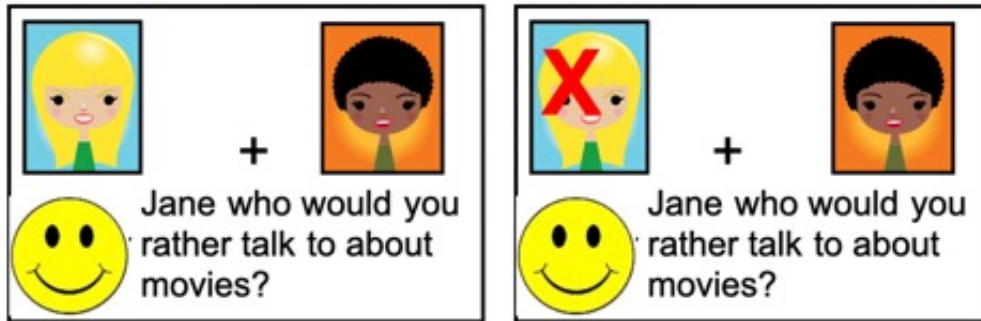


Mood, Imaging, & NeuroDevelopment

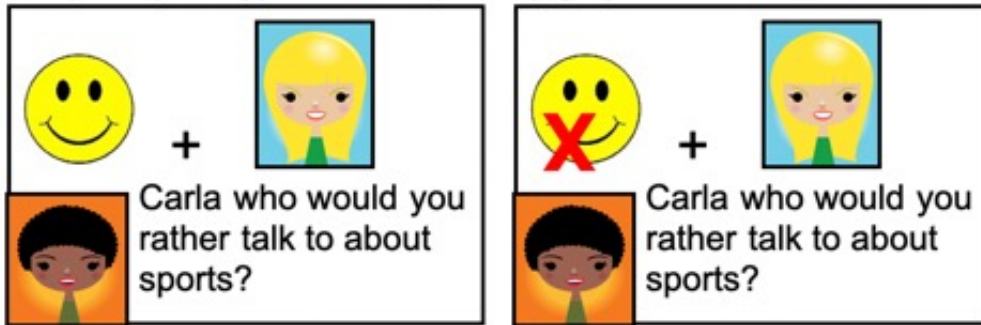
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NSSI Children (n=33) Have Significantly Different Brain Activity During Peer Rejection vs. Controls (n=22)



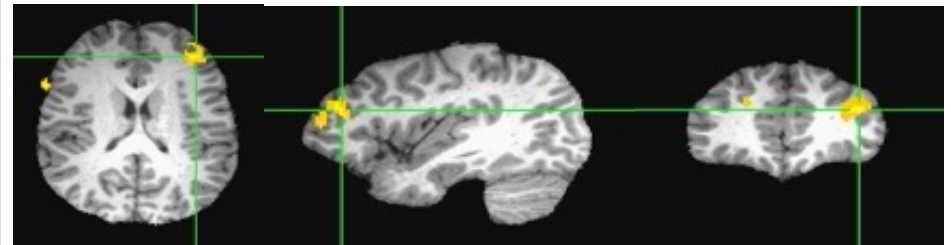
Participant (smiley) chooses "peer" (right) to chat about movies.



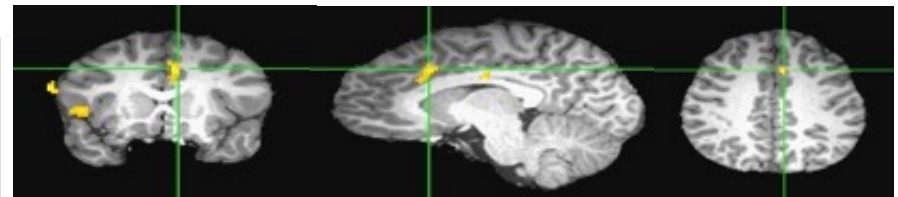
"Virtual Peer" rejects participant & chats with "peer" about sports. Chatroom uses photos of participant & virtual peers, not cartoons.

NSSI n=33 TDC n=22

Ke 281 X=-35 Y=-43 Z=18 Left BA 10



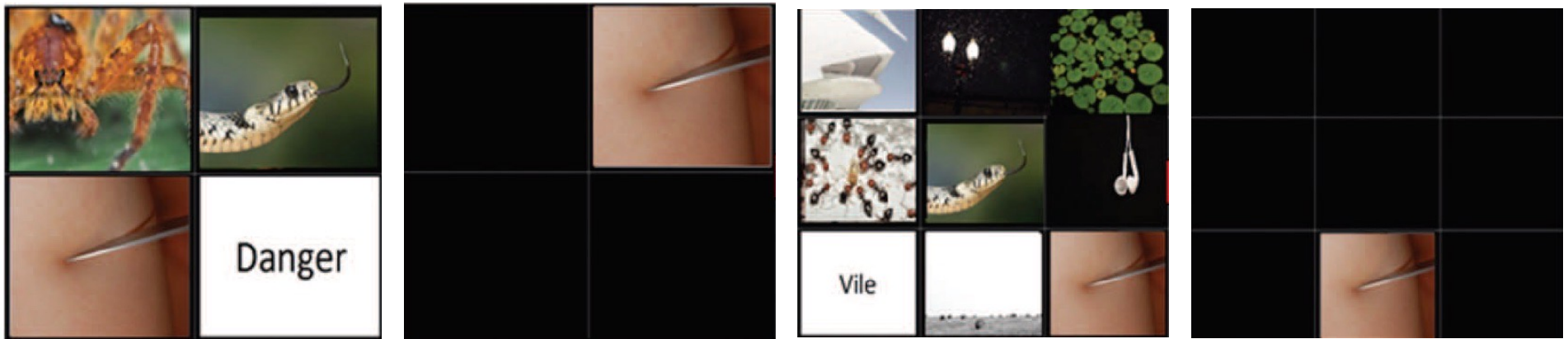
Ke 57 X= -5 Y=-17 Z=33 Left Ant Cing Cortex



Therapeutic Evaluative Conditioning (TEC): Mobile Intervention for Self-Injurious Thoughts & Behavior

(Franklin JC J Consult Clin Psychol 2016)

- Targets: ↑ aversion to NSSI/self-harm & ↓ aversion to self
- 3 studies adults randomized to TEC vs control app 1 month (N=114, 131, 163)



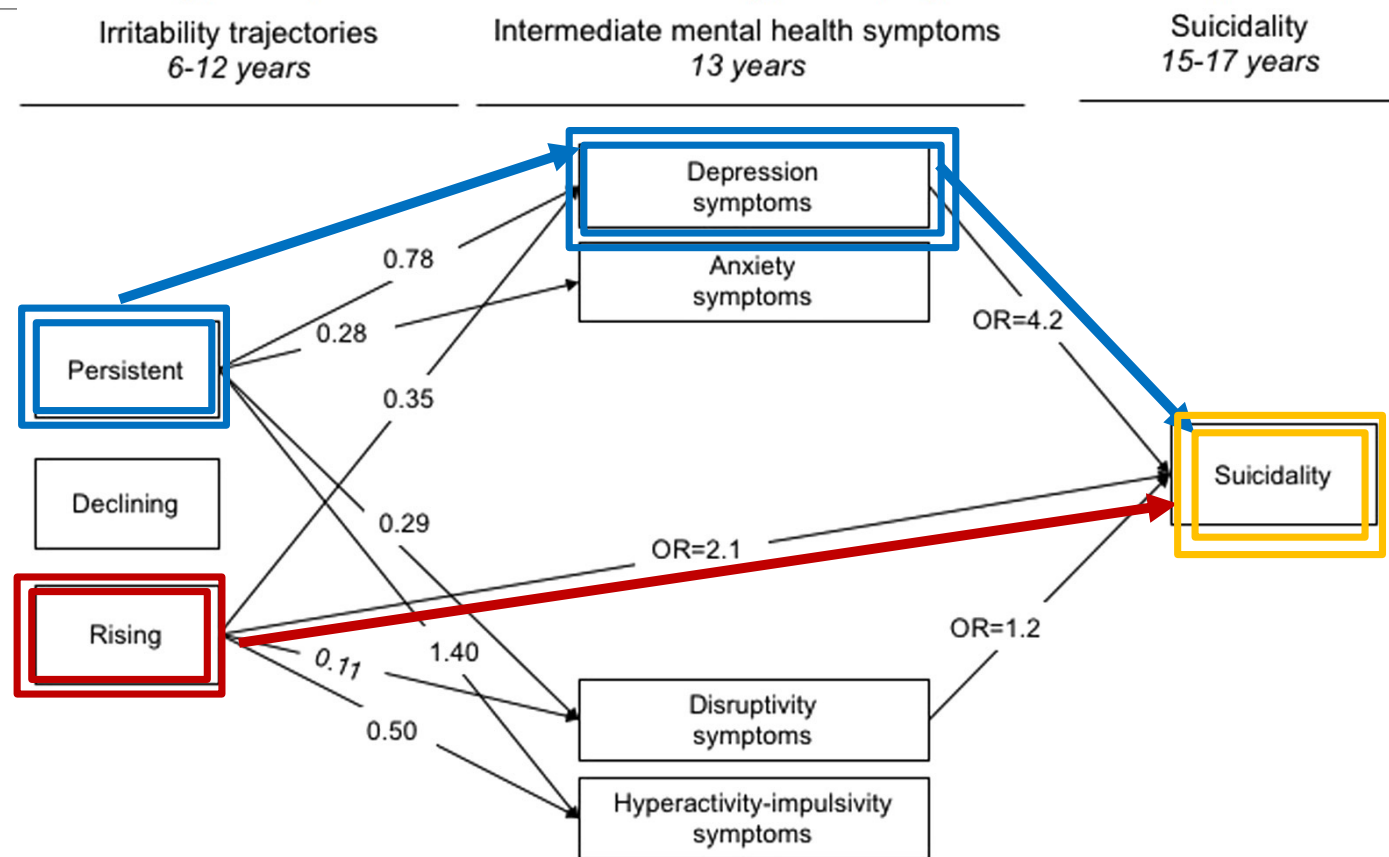
- Results:
 - TEC reductions in NSSI (32-40%), suicide plans (21-59%), suicidal behaviors (33-77%)—no reduction in SI
 - 2 of 3 studies showed TEC impacted targets
 - Not maintained at 1 month follow up

Pathways of Association Between Childhood Irritability and Adolescent Suicidality

JAACAP

2019

Massimiliano Orri, PhD, Cedric Galera, MD, PhD, Gustavo Turecki, MD, PhD, Michel Boivin, PhD, Richard E. Tremblay, PhD, Marie-Claude Geoffroy, PhD, Sylvana M. Côté, PhD



- N=1393 Quebec Longitudinal Study of Child Development followed birth→17 yo
- Teachers rated irritability yearly. Children self-report dep, anx, disruptiveness, hyper/impulsivity @13yo and suicidality @15 & 17 yo
- 4 trajectories: low 75%, rising 13%, declining 7%, & persistent 5%



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?*

PediMIND



Mood, Imaging, & NeuroDevelopment

www.PEDIMIND.org

PEDIMIND@partners.org

Summary & Future Directions:

- 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
- 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
- Key question #1: What is the neural mechanism underlying NSSI-only/itself?
- Key question #2: What is the mechanism NSSI-only → 1st suicide attempt (vs. continuing with NSSI-only or remitting?)
- Key question #3: What is the mechanism of repeat suicide attempt?
- 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.

To learn more—or to share with
other families & providers:

www.PEDIMIND.org

617-855-3900

Facebook/Instagram Pedi MIND

*Together—we can make a
powerful difference.*

Thank you!!

- Families who have courageously participated.
- Funders who have supported this work.



- PediMIND Program—a dedicated, talented team!



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